

THE IRON AGE

THURSDAY, JANUARY 5, 1888.

Apparatus for Heating, Setting and Removing Tires.

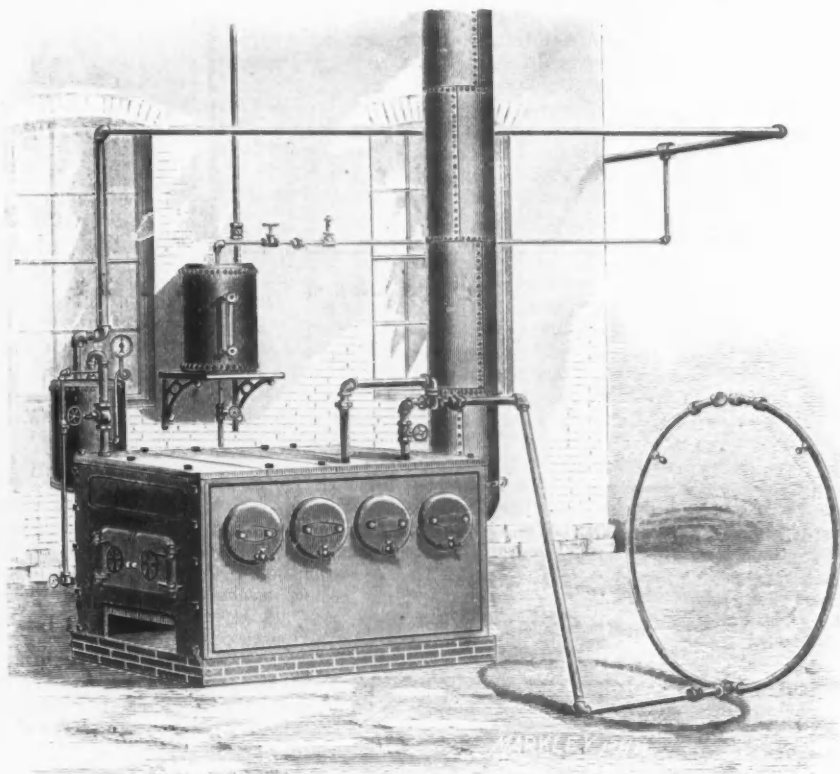
We present on this page an engraving of an arrangement recently put on the market by Messrs. Pedrick & Ayer, of Philadelphia, Pa., for putting on new tires or taking off old ones without removing the wheels from under the engine, unless there is work to be done on the wheel centers. It will do all the work connected with tire heating, setting, removing, shimmering and replacing. With this apparatus and system of doing the work, it is claimed that less than one-tenth of the time is consumed, and the paint on the wheel centers is not injured. In case of a loose tire it is

air pressure, a needle-pointed valve for regulating the flow of oil, and an injector arrangement for forming and mixing gas and air for burning in the hoop around the tire. The operation of it is very simple. After the oil reservoir is filled and the oil cocks shut off so that no oil will enter the retorts, a fire is built in the furnace with any fuel desired. In about half an hour the retorts will be hot enough to make gas. Then the hoop is placed around the tire, connecting it to the connection containing the injector arrangement. The air-pump is started up until there is an air pressure of from 15 to 40 pounds, and the needle-pointed valve is opened very little, until a rich smoke escapes through the holes of

Heights were forced to shut down until an arrangement was made with the Hackensack Water Company, which supplies water to Hoboken. The broken pump is said to have been used for ten years.

Power Press Problems.*

In its essential features a power press, as usually built, is really a very simple machine, consisting chiefly, as far as its moving parts are concerned, of a slide-bar connected to a crank on its main shaft by an adjustable pitman—this shaft being detachable from the fly-wheel or gear which runs loose upon it by an automatic "stop clutch" actuated by a treadle. Such a



APPARATUS FOR HEATING, SETTING AND REMOVING TIRES AT THE PENNSYLVANIA RAILROAD SHOPS, WEST PHILADELPHIA, PA.

not necessary to take down the connections. In taking off or putting on new tires the connections are taken down. A short time ago we published an engraving showing the device mounted on a push-car, while the present illustration shows it arranged stationary. We may repeat here that in all cases the engine is jacked up so that the wheels will clear the rails about 2½ inches to allow the burning hoop to be placed around the tire. This hoop is not a continuous ring of pipe; the ends are plugged up and are left a little space apart so they can be placed on the wheels while the connections remain on them, and small studs are placed in hoop to hold it off from the tire at a proper distance. The machine consists of a furnace or generator in which are four (4) cast-iron retorts, three of them for making the gas, the other one for heating the air that is used with the gas; allowances are made in the construction of the furnace for contraction and expansion. In addition to this generator is an oil reservoir for holding common kerosene oil; an air reservoir, a gauge for registering the

the burning hoop. Then the air-cock is opened to allow air to mingle with the gas, and, when a proper mixture is made, a torch is applied and an intensely hot and blue flame will strike the tire, penetrating it very quickly. As very little oil is required, a fine thread screw is made on the needle valve, so that it is very sensitive. The gas is made only as fast as used, and as there is no accumulation there is no danger from explosion and no waste. When the tire is hot enough the supply of oil can be shut off, the flame stopped and the generator also. A 4½-foot and a 5-foot burning hoop are furnished with each machine. At the regular standard of shrinkage tires can be taken off or put on in from four to ten minutes each. The cut shows the plant as erected at the West Philadelphia shops of the Pennsylvania Railroad Company.

The duplex pumping engine used in the high water service of the Jersey City water works broke down on Friday, and all the factories and silk mills situated on the

machine, to a casual mechanical observer who had not studied it as a specialty, would seem to be far easier to design than machine tools proper, but after taking it up as a specialty his judgment would be reversed and he would find several knotty problems to keep him awake at night while the builder of lathes or planers was quietly sleeping the sleep of the just. This difference arises partly from the fact that power-press building is both a newer and a smaller industry than the making of machine tools. It has not been so fully experimented with, either in point of time or in regard to the number of experiments. In other words, these machines have not arrived at the same stage of development in the evolution of their race as have the older and more numerous tribe of lathes and planers.

A more important difference, however, lies in the fact that machine tools are subjected to very little percussive action,

* From a paper by Oberlin Smith. Presented at the Philadelphia meeting of the American Society of Mechanical Engineers.

while all the parts of a power press are constantly endeavoring to hammer themselves and each other to pieces. This is due chiefly to the fact that the work in the dies offers a sudden resistance to the moving parts when it is struck, and, incidentally, to the sudden stopping and starting of several heavy members of the machine while the wheel which drives them revolves at a constant speed. As a consequence of these conditions one of the problems arising is how to fasten the parts together so that nothing will jar loose or come apart while in action. This difficulty can usually be overcome by the use of lock-nuts upon all screws and by driving fits where screws cannot be used. Such fits, however, are objectionable where facility of taking things apart is properly provided for, and none of the presses in the market are yet ideally perfect in this respect.

Another problem which has not been solved in a wholly satisfactory manner is to make an adjustment of the slide-bar which is long enough in range, and yet which combines simplicity and cheapness of construction with such strength and security of fastening as to withstand the heavy blows and pressure to which it is subjected. Among the most simple devices for this purpose is perhaps some form of eccentric, either at the upper or lower end of the pitman, but the chief objection to these is their short range of adjustment—since it is difficult to clamp them firmly enough in place so that they will not revolve if their eccentricity is very great. Various kinds of flat wedges have also been used, but are open to the same objection. In some kinds of presses a screw-thread upon the pitman itself, with lock-nuts or other clamping devices, has proved successful, as has also a special screw between the slide-bar and the bearing by which the pitman is attached thereto. The latter, however, lacks simplicity, and all these screw devices, though giving almost any desired range, take too much range for the compactness of design which is usual for punching presses for heavy metal. A very good long-range adjustment can be gotten by making the bed of the press to set up and down; but this again increases cost, especially if made as strong as the rest of the press frame.

A third and more difficult problem is to make an automatic stop-clutch, which, by a slight motion of a treadle or hand-lever, will instantly throw the main shaft into gear with the driving-wheel which is revolving upon it, and which will at the same time lock the shaft and wheel together securely against rotary stresses in either direction. By "instantly" is meant within a small part of the wheel's revolution, say from one-third to one-sixth, but it is better if the actual starting is not instantaneous, that time may be given for the inertia of the shaft and attached parts to be overcome, so that they may start gradually. This has been attempted by various forms of friction clutches, which, if successful in all respects, would not only tend to lengthen the life of the press by avoiding the sudden hammer blow incident to the ordinary clutch, but would, by the quietness of their action, minister soothing balm to the nerves of the operator and all other persons unfortunate enough to be working in shop or counting-room in the near vicinity. My own experience has, however, led me to believe that this friction-clutch business is a very difficult one to deal with, as the amount of power to be conveyed to the shaft at the time of doing its hardest work is much greater than in the case of ordinary friction pulleys and clutches for shafting. A device can undoubtedly be made strong enough to do the work properly if the friction is applied out near the rim of the wheel, where it will act with considerable leverage, but the

difficulty then is that the parts of the mechanism which are attached to the shaft are so bulky that they give too much momentum for the sudden stopping of the crank at the top of its stroke when the clutch is thrown out. The experimenter with such a clutch, where he may have to stop the crank at every revolution not more than 5° or 10° from a fixed point, perhaps as often as 100,000 times a day, with the enormous locking pressure necessary, will find that he has in hand a very different matter from that of stopping and starting a line of shafting, where the time of several revolutions may be used for full engagement or disengagement. In my own practice, after experimenting with friction and with various forms of springs to give an elastic blow, I have fallen back for the present on the old principle of a positively locking clutch as the best practicable thing, in spite of the noise and jar which it creates. Such automatic friction clutches as I have observed in commercial use seem to be adapted for light work only, and do not run as quietly as they should. It is earnestly to be hoped that time will solve this problem in favor of a noiseless clutch of some kind.

When power presses were first invented their use was such a great improvement upon previous methods that it was considered good enough to wait for the wheel to come around to a certain single point of locking with the shaft, and then to have no provision against "backlash." In these days, however, competition in getting out presswork rapidly has made it necessary that the shaft shall start as soon as possible, and it is considered desirable to have from three to six interlocking points upon the wheel, according to the speed. It has also become necessary to avoid backlash, on account of the frequency with which "spring-drawing dies," so called, are used. In these there are very powerful springs which have to be compressed by the downward action of the slide-bar, and which, in reacting, tend to push it upward during its up-stroke faster than its normal rate of speed. In such cases, if the wheel and shaft are not rigidly locked against relative motion, the shaft gets ahead of the wheel, so to speak, for a time, and, as soon as this action ceases, there is an unpleasant blow from the wheel catching up again. As before intimated, this rigid interlocking is difficult at the high rate of speed at which the clutch is usually thrown into gear, and the tendency of the shaft to run away from the wheel on the up-stroke has to be stopped by a friction brake. This, however, if set tight enough to work properly, wastes a great deal of power, unless it is made automatic, so as to act only at the particular time desired. This, again, makes additional expense, and detracts from the simplicity so desirable in machines of this kind.

A fourth problem is to throw the clutch out of gear automatically as to make the shaft stop exactly in the angular position desired. This would be easy enough were the speed, lubrication and tightness of adjustment of the wearing parts uniform, as well as the weight of dies and other attachments on the slide-bar; but, under existing conditions, there is great variation in the position of stopping, principally caused by a variation of speed of the driving power. This difficulty has been partially overcome by a friction brake upon the shaft, but, as before said, it frequently wastes a good deal of power by the holding down of the treadle, without being stopped at each up-stroke, especially where the press is running continuously.

In the practical working of these presses many other minor problems arise, due to the accelerating or retarding action of the various attachments which are frequently put on presses for feeding and gauging the work, &c. In general, it may be said that all press makers have found it

somewhat difficult to contrive a clutch and brake arrangement which is simple, durable and cheap; but which can be put upon all presses of a given size and sent out to take its chances among the multifarious conditions which the user (generally not a machinist, as is the user of a machine tool) may impose upon it. These may consist of speeds too fast or too slow; wearing adjustments set too tight or too loose; slide-bars normal or heavily loaded; shaft normal or loaded with various cams, gears, &c., for automatic attachments; ordinary dies or dies fitted with strong reactionary springs; dies for thick punching which do their work during a considerable portion of the stroke, or embossing dies which meet heavy resistance only at the end of the stroke, and perhaps cause an upward reaction by the resilience of the press frame itself—which in open front presses is often very powerful, owing to the elasticity of the metal. Furthermore, if, for the sake of uniformity in manufacturing, the standard clutches, &c., are also used in various geared and non-geared drawing and other double-action presses, still other conditions arise—and the molecules of the press-maker's brain fiber must swing in orbits still different to meet and conquer them successfully.

The Manufacture of Carbon Electrodes.

The abuse which has been showered on arc lamps for their flickering and unsteadiness has not been without justification, but still a considerable part of the blame, which has been directed to the mechanism, might, with more propriety, have been bestowed on the carbons. It is quite impossible for a steady illumination to be obtained with electrodes composed of many heterogeneous substances, some of which will burst out into flame under the heat, and entirely alter the condition which the regulation of the lamp is designed to meet. Yet, if coke be the material from which the pencils are made, it is impossible to exclude many elements which do not add to the general good effect and greatly reduce the steadiness of the arc. Silica is a great offender in this respect, while most of the metals color the light with unexpected and undesirable tinges. The best arc lamp ever designed must fail of producing the highest results, if it be supplied with carbons which are not perfectly homogeneous from end to end. The use of coke made from coal has therefore been abandoned by the best makers of carbons, and in place of it some form of pure carbon is employed. In a recent article on the subject *Engineering* describes in an interesting manner the method of manufacture adopted at a prominent English establishment.

The material employed is the residue from the distillation of mineral oil. It is brilliant in aspect, very light and brittle, and its appearance is just what would be expected from a distillation process carried on until scarcely anything but carbon remains. This coke is broken into a very fine powder in a disintegrator, an operation which is very readily effected, as it can be easily crushed in the hand. It is next heated and then mixed with a so-called tar, the smell and taste of which reveals the presence of heavy oil as one of its constituents, while pitch is probably another. A charge of 65 pounds of the mixture, containing about three parts of coke to one part of tar, is then ground for 45 minutes under edge-runners, to thoroughly incorporate the two substances, after which it is ready to be molded into rods, plates, or any other forms in which it may be wanted. The molding process is carried out by machinery, which recalls that by which lead pipe is manufactured. The hydraulic cylinder is horizontal, and is fitted with a

ram capable of being moved both out and in by the water, which in the latter case acts on a small annular area. At the outer end of the ram is a plunger which enters the molding cylinder and compresses the plastic material with a pressure of $5\frac{1}{2}$ tons on the square inch, forcing it out through a die which varies in diameter, according to the size of the rod desired. The issuing stream of carbon runs in a trough provided with rollers to lessen the friction, and when it has attained the length of three rods it is cut into three parts by knives on a rocking shaft, operated simultaneously by hand. The rods are then picked up and made into a pile, a little carbon dust being scattered over them to prevent them sticking together. When core carbons are being manufactured, the die is fitted with a central needle which converts the rod into a tube having a bore of about $\frac{1}{4}$ inch. The molding cylinder is fitted with steam pipes by which it can be heated, but at the time of our visit it was working cold.

The rods are straightened by being rolled by hand, and are then dried sufficiently to bear being packed in iron boxes. These boxes are placed in furnaces fed with gaseous fuel from a Wilson producer, and are raised to a bright red heat for several hours, during which time the gaseous elements of the materials employed are driven off, leaving a perfectly pure carbon of great density, and emitting a sharp metallic sound when struck. The core carbons are filled by being forced into the conical opening of a die through which a fine stream of specially soft and plastic carbon compound is being expressed, which entirely fills their bore. This core, as most people are aware, burns away more rapidly than the wall surrounding it, and by this action keeps the arc in the center of the carbon, instead of permitting it to travel round and round as it has a natural tendency to do.

When the carbons come from the furnace their conductivity is tested by an exceedingly ingenious automatic machine. They are placed in a tapered hopper, the bottom of which is closed by a rotating cylinder. Lengthwise of this cylinder there are four equidistant grooves of such a size that as each groove presents itself to the hopper a carbon falls into it and is carried forward out of the hopper. When the rod emerges its ends pass under two springs, and an electrical circuit is established between the two through the carbon. In this circuit there is included a battery and an electro-magnet. Attached to the armature of the magnet there are two fingers which ordinarily lie in two circumferential grooves in the rotating cylinder, but which are lifted out of these grooves when the magnet is fully excited. Now, if a carbon of good conductivity pass under the springs the fingers are raised out of its path, and it eventually falls out of the groove into a hopper. If, on the contrary, the carbon rod offers too great resistance to the passage of the current, the fingers switch it out of its groove, and direct it into another hopper. Those that pass the test are ground square at one end and pointed at the other, and are then packed, unless they are required to be coppered, in which case they are suspended for five minutes in a solution of sulphate of copper, and electro-plated with a thin covering of that metal.

According to the *Wochenschrift des Oesterr. Ingenieur und Architekten-Vereines* a company has been formed in Valencia, Spain, to establish an electrical plant, which is to furnish all the power required in the various manufacturing industries in and about the city. It is to be capable of producing 3000 to 4000 horse-power, and to transmit it to distances within the limit of 35 English miles. The plant is to be run by the water-power of the Turia River.

The Billings Improved Scratch Gauge.

The Billings & Spencer Company, of Hartford, Conn., have just brought out the improved scratch gauge which we show in the annexed engravings:

The scratch gauge is fully as useful a tool to the mechanic as the surface gauge, and in the tool shown the objection heretofore existing in setting the head to the exact desired distance from the marking

receives the bar. An eye bolt, provided with a hole of the same size as that in the head, passes through a hole drilled in the bottom of the center of the slot. This hole is enlarged at the bottom to receive a spiral spring that encircles the shank of the eye-bolt, the shank projecting above the head and being provided with winged thumb-nut. The tightening of this nut draws the eye-bolt up and forces the head down upon the bar. When the nut is un-

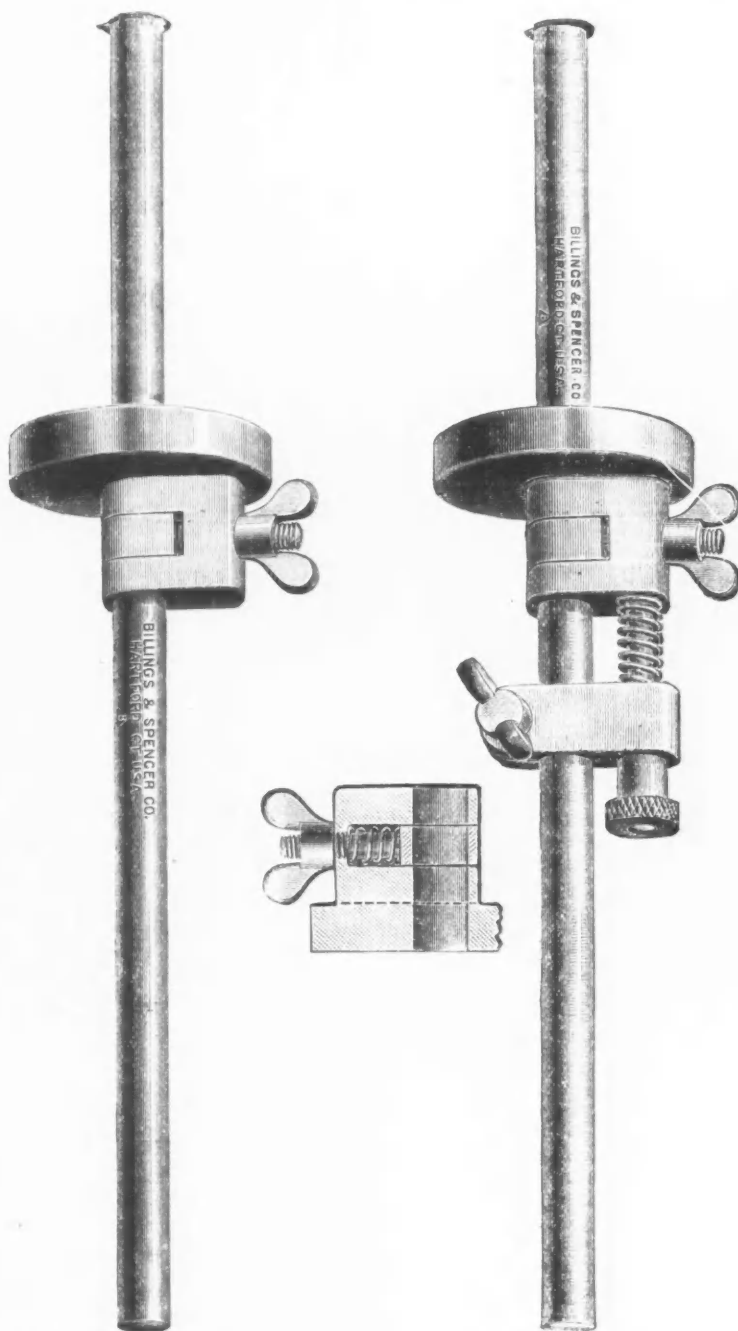


Fig. 1.—Gauge without Screw Adjustment.

Fig. 2.—Gauge with Screw Adjustment.

IMPROVED SCRATCH GAUGE, MADE BY THE BILLINGS & SPENCER COMPANY, HARTFORD, CONN.

point has been overcome. The tool is drop-forged of the best steel for the purpose, and finished in a thorough and workmanlike manner. In addition to the sliding head there is also a sliding snug, split and held in place, in any position on the bar, by means of a thumb-screw. This snug is connected to the head by means of a screw inclosed by an open spiral spring. The screw passes through a hole in the snug and is fitted with a knurled head thumb-nut for clamping the head to the bar. A slot is cut at right angles to and somewhat deeper than the hole that re-

screwed the spiral spring acting upon the eye-bolt gives sufficient friction to prevent the head from moving too easily when setting to the desired measurement. In operation, any movement along or around the bar of the head, with screw adjustment, will be accomplished by the head in consequence of its connection with the screw, but the head may be moved by turning the thumb-nut on the screw connected to the head acting with the spiral spring, so that while the snug is held firmly in place by its binding screw, the head may be accurate.

Mercurial Air Pumps.

At a recent meeting of the British Society of Arts, a paper, dealing in a very complete manner with mercurial air pumps, was read by Professor Silvanus Thompson. The author stated that in 1643 Torricelli discovered the possibility of producing a vacuum above the top of a mercury column, by filling with mercury a tube closed at one end and then inverting it into a cup containing mercury, and this discovery forms the basis of all true mercurial air pumps. These may be divided into six classes: I. Those which drive the air up a barometric tube. II. Those which drive the air down a barometric tube. III. Those which drive the air up one barometric tube and down another. IV. Combination pumps. V. Injection pumps dependent in their action upon the velocity of efflux of a stream of mercury. VI. Mechanical mercurial pumps. The oldest mercurial air pump, properly so-called, belongs to Class I., and was invented by Swedenborg before 1722. The apparatus consisted of a table standing on three legs, and into the top of this is let a brass plate, forming a stand for the receiver from which it is desired to exhaust the air. In the plate are two holes, one of which is closed by a tap, and is simply designed to allow air to enter the receiver when the experiment is finished, but the other communicates through a valve opening downward with a conical iron vessel placed beneath the top of the table. This vessel is provided with another valve opening upward which communicates with the outer air. The lower end of the above-mentioned vessel ends in a flexible leather tube, to which is adapted a piece of iron tubing ending in an open mouthpiece, which can be alternately raised and lowered. To work the pump, mercury is poured into the mouthpiece, which is raised till the mercury completely fills the conical vessel previously mentioned, driving the air contained therein through the valve communicating with the atmosphere. If the mouthpiece is now lowered the mercury in the cone will fall, and air will pass from the receiver into the space thus left, and on again raising the mouthpiece will, by the rising of the mercury, be driven out into the outer air. By repeating the process several times a fairly good vacuum could be obtained.

Since Swedenborg's time great improvements in detail have been made by various experimenters, among whom must be mentioned Geissler, of Bonn, who constructed his first pump in 1855, which, though considerably altered in detail, has formed the basis of most of the pumps now used for exhausting glow lamps. In 1864 Professor Robinson suggested that the pump might be shortened by partially exhausting the air from the surface of the mercury in the supply vessel, and this device has been adopted in most of the pumps at present in use. In 1881 Schuller described two very ingenious forms of valve. In one of these the pipe leading to the pump-head was made by fusing a piece of tubing, which had been drawn down to a conical point, into another piece of tube, so that the passage through the tube was contracted at the tip of the cone, leaving an aperture having a diameter of only about 3 mm. Through this the mercury freely passes on its upward path to the pump-head, but on coming down again the last drops of mercury remain behind at this spot, and form, owing to capillary attraction, a little cap over the tip of the cone, giving a very perfect form of valve. The autotype of Class II. is Sprengel's air pump, which was devised in 1865, and has since undergone great improvements at the hands of Crookes, Gillingham and others, and a method of working this pump at a high temperature was devised by Professor

Rood in America, who also introduced a bend in the fall pipe, and with this arrangement claims to have obtained a vacuum amounting to $\frac{1}{316}$ millionth of an atmosphere. The degree of exhaustion, it may be remarked, is measured by a Macleod gauge, which was invented in 1874, and depends on the principle of compressing a known volume of the rarified air into a smaller space, which is then measured. The other classes of pump, though interesting from a scientific point of view, do not appear to come into much practical use, and we will, therefore, not refer to them further. In all, rather more than 40 different forms of pump were mentioned by Professor Thompson. At the close of the paper the chairman, Mr. William Crookes, F. R. S., observed that opinions as to what constituted a perfect vacuum had greatly altered since the days of the old mechanical pump, with which instrument an exhaustion down to $\frac{1}{760}$ of an atmosphere was considered extremely good. With the Sprengel as first introduced a perfect vacuum was supposed to be obtained, but the introduction of the Macleod gauge showed this idea to be erroneous. The best vacuum Mr. Crookes had personally obtained was equal to $\frac{1}{160}$ millionth of an atmosphere, corresponding to $\frac{1}{16}$ inch on a barometer 200 miles high, but even at this pressure there would be 10,000,000,000 molecules in a cubic centimeter of air.

The discussion was opened by Mr. J. Swinburne, who preferred the long pumps to the shortened ones, as it was very difficult to preserve the partial vacuum above the mercury in the reservoir. He doubted the accuracy of the Macleod gauge, as Regnault had, he believed, stated that the vapor pressure of mercury was about fifty-one millionths of an atmosphere at ordinary temperature. The Geissler pump he had found to give more perfect vacuums than the Sprengel, and he therefore preferred it. In answer to a question from Professor Thompson he might state that he had found silicate of soda made a very good cement for making air-tight connections.

After a few remarks from Professor Ramsey, who has also investigated the vapor density of mercury, and shown that Regnault's results are very inaccurate, Mr. Vernon Boys stated that he had found the improvements in the Sprengel pump, mentioned in the paper as having been introduced by Professor Rood, of the utmost value, as the heating seemed to make the mercury stick close to the glass, while the crook in the fall-pipe did away with the hammering in the mercury.

In replying to the discussion Professor Thompson stated that the advantage of the shortened pumps was that the air clung less closely to the mercury, and a better result can therefore be obtained.

Referring to Mr. Swinburne's remarks as to the inaccuracy of the Macleod gauge, Mr. Crookes stated that he believed that if proper precautions were taken its indications might be fairly well relied on; thus the mercury vapor might be kept out of the gauge by putting a fragment of iodine in the connecting tube, and, to prevent vapors from this passing into the gauge, a further fragment of sulphur is inserted, which absorbs vapor of iodine, and, finally, to prevent vapors of sulphur passing over, finely powdered silver is used, which completely absorbs them.

On the 2d of November Hon. Carl Schurz addressed a letter to the Hon. T. F. Bayard, Secretary of State, asking him whether the State Department would accept 20,000 copies of a work to be published, free of cost to the Government, with a request that they be distributed through the consular service at such places abroad where they might be

expected to attract custom. Mr. Bayard replied favorably a few days later. The plan outlined by Mr. Schurz is the publication of what is to be called "The United States Export Almanac," to contain a series of general descriptive articles on the resources of the United States, with special reference to fostering the export trade. Among the contributors we note Hon. S. S. Cox, Edward Atkinson, David A. Wells, Robert P. Porter, J. S. Moore, Paul Loeser and others.

Hydraulic Hammer.

An interesting piece of machinery, shown at one of the several recent English exhibitions, was a 300-ton hydraulic hammer or squeezer made by the Blaydon Iron Works, of Blaydon-on-Tyne, and embodying quite a new mode of applying hydraulic power for forging steel and iron ingots. Our contemporary, *Industries*, in a recent issue, published engravings of it and described it as follows:

It consists of a vertical cylinder 20½ inches diameter, fitted with gun-metal glands and steel studs and nuts, and capable of working to 2000 pounds per square inch. The cylinder is supported by four wrought-steel columns, which form the guide for the cross-head of the ram, the whole being carried upon a massive cast-iron bed-plate. The ram is 19½ inches diameter, 15 inches length of stroke, and is fitted with gun-metal packing-ring and studs. The cylinder is fitted with a valve box for controlling the water supplied from a tank, and an arrangement of valves and cylinders for automatically releasing the water when the maximum pressure has been reached. The engine and pumps consist of a vertical engine having a cylinder 16 inches diameter, 12 inches length of stroke, fitted with metallic packed piston, gun-metal glands, neck bushes, drain cocks, and cased with sheet bronze. The crank and pump shaft are of steel, and carry a massive fly-wheel 9 feet diameter, weighing 2½ tons. The three-throw pumps have gun-metal rams 4 inches diameter, 6 inches length of stroke, and the valve box in connection is fitted with three gun-metal suction and three delivery-valves with seatings and fitted with spring relief-valve. The arrangement of working is somewhat as follows: The ram is brought down to its work by a head of water, and as soon as the die comes upon the ingot to be forged the pressure of the pumps comes into play, and the squeeze is completed by the momentum of the fly-wheel. By this means a powerful and comparatively slow squeeze is obtained, and an accumulator is dispensed with, and more effect is gained than by a great number of blows from a steam hammer. When what we may term the pressure blow is complete, the hand-lever is thrown out of gear by a self-acting valve, and the ram is raised, then the ingot is turned partially round for another pressure blow, and so until the ingot is reduced to the intended size.

There appears to be decided advantages in this system of applying hydraulic power, both as compared with the ordinary method of using hydraulic power by means of an accumulator, and as compared with steam hammers. With one engine and pump several hammers can be worked, and the steam consumed by the engine is proportionate to the work done. The accumulator is dispensed with, causing great economy in working. Although this hammer, says *Industries*, may not appear to work so rapidly as a steam hammer, yet the amount of work actually performed is greater and more effective, as it has been found that, in dealing with large masses of steel, a powerful squeeze is more efficacious in consolidating the ingots than a succession of blows as applied by the steam hammer. The blows, being comparatively

light, produce a hardening and consolidating effect upon the external surface of the ingot, but leave the interior more or less porous. This latter defect, it is well known, has often caused steel forgings to be condemned after much valuable work had been expended on them. It may also be pointed out that in consequence of the hammer being self contained the foundations needed are light and inexpensive, and there is an absence of noise and vibration. It is also noteworthy that by this system there is a constant circulation of water through the whole machine and back through the tank in connection with the pump, so that there is little liability of the water freezing.

The Improved Valley Steam-Pump.

Other things being equal, probably the best direct-acting steam-pumps in the market are those which have the most positive

sign which will be noticed at once is that the valve stem now connect both ends of the auxiliary valve; formerly it was connected only to the end nearest the stuffing-box. In the new design the web connecting the two faces of the auxiliary valve might be broken and the valve stem would still carry it. In describing the valve motion we will consider only one end, since the operation would be precisely similar for the other one. Placing the main valve B in its proper position it will cover the six rectangular main and exhaust ports, the groove or channel in the face of this valve straddling the web which connects the two faces of the auxiliary valve. We should remark here that the valve stem lies in a groove in the web that connects the two faces of the auxiliary valve. This will be understood by a glance at the valve A. The passage of the steam is as follows: Entering the port marked 1 it crosses to 2 and passes up this to the space behind the

which by far the greater majority of boiler insurance companies are worked. It is well known that many boiler explosions have taken place of insured boilers, and that many of them had not been thoroughly examined for from three to even ten years, yet the policy of insurance was renewed year after year, on the premium being paid, the company contenting themselves by simply writing the firm to the effect that their boiler had not been thoroughly examined for such a time, but scarcely ever refusing to renew the policy of insurance, should the boiler not be prepared for thorough inspection before a given date, preferring rather to take the risk and save the cost of inspection, in order to swell the dividends for the shareholders at the end of the year, than running the risk of losing the boiler, they knowing that it pays them better to run the risk than pay the price of efficient and thorough inspection once a year. It is very sad to know that this is

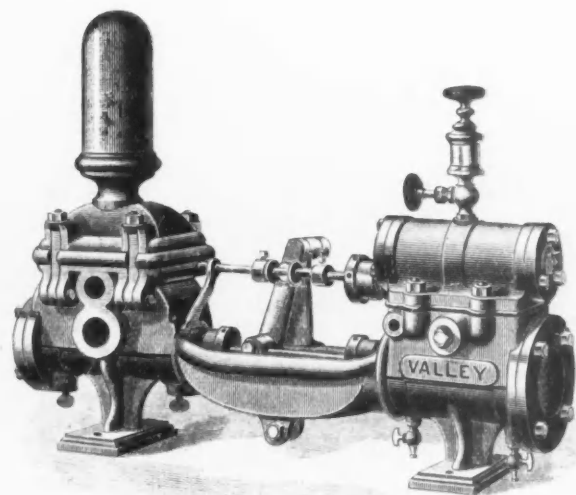


Fig. 1.—Perspective.

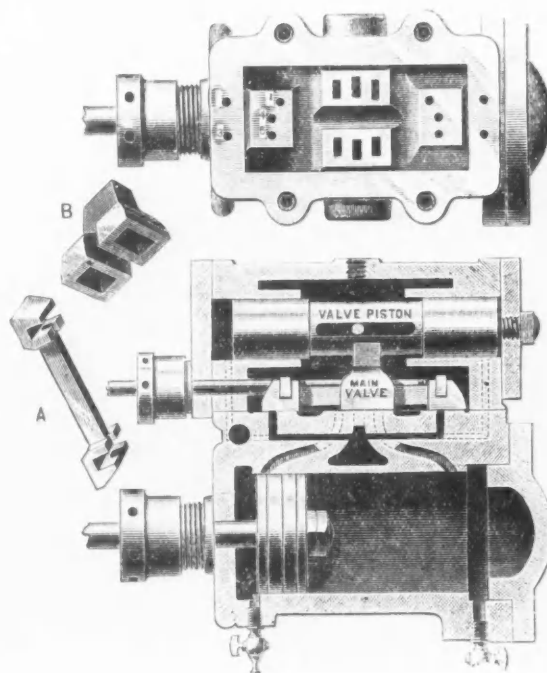


Fig. 1.—Plan of Valve Seat and Section of Valve and Steam Cylinders.

THE IMPROVED VALLEY STEAM PUMP, BUILT BY THE VALLEY MACHINE COMPANY, EASTHAMPTON, PA.

and durable methods of moving the secondary or auxiliary steam valves. We take pleasure, under the circumstances, in publishing engravings of the Valley Steam-Pump in its recently improved form, as built by the Valley Machine Company, of Easthampton, Mass.

It will be noticed that a lever is attached to a cross head on the main piston rod, its upper end working in a bearing made for the purpose. On the face of this and near the upper end is a circular projection, or lug, which fits between the heads of a loose spool on the valve stem. As the main piston rod works back and forth, giving a swinging motion to the lever, the lug slides the spool along on the valve stem, at the same time giving it a rotary motion, until it comes in contact with the tappet buttons which are firmly fastened to the valve stem. Then the auxiliary valve is carried along until the main piston reverses. By this method of moving the auxiliary valve no blow is given to the tappet button, as in the old form, and there is no noise from this source.

The formation of the valves and their arrangement will be understood with little difficulty from Fig. 2. In this the main and auxiliary valves are marked B and A respectively, and the ports 1, 2, 3, 4 and 5. One of the changes from the old de-

valve position. The exhaust is accomplished through the ports 3 and 4 to an exhaust recess in the valves, thence through the port 5 into the main exhaust. The whole action, it will be observed, is very simple. The main valve, of course, is driven by the valve-piston to which it is attached.

British Methods of Boiler Inspection.

Two recent disastrous boiler explosions in England have stimulated renewed inquiry into the methods practiced by English boiler inspection and insurance companies. As on a number of previous occasions, it has again strikingly shown that the basis on which nearly all these companies conduct business cannot be too strongly condemned, ruinous competition having rendered the so-called inspection service wholly valueless—in fact, in a certain sense, dangerous. A correspondent of *Engineering* aptly portrays the situation in the following remarks:

* * * Boiler insurance is all very well in its way, if those companies would only inform their members that their policy is "insurance first," inspection being only a secondary consideration with them, as in so doing they would be telling them the candid truth, for that is the principle on

the case, but can it be wondered at when boilers are insured for several hundreds of pounds, at the remunerative rate of from half a guinea to fifteen shillings per boiler, and how can a boiler owner expect to get efficient and thorough inspection of his boilers for such a sum? Yet these are the insurance companies whose chief engineers tell us that "the present machinery for boiler inspection is adequate to insure freedom from explosion if the owner will prepare his boiler for thorough examination every year, and will not insist in trying to get inspection for less than what it is worth," yet they have agents and canvassers running about the country trying to ascertain how much a boiler owner is paying for insuring his boiler, and when they do get to know they offer to do it by their company at a considerable reduction in the premium, and issue in most cases a policy of insurance without any inspection whatever except what inspection the agent could give when canvassing for the boiler. * * * It is high time that this system of boiler insurance was put a stop to, and a system adopted similar to the one carried out by the Manchester Steam Users' Association, and that is that they accept responsibility of no boiler without at first making a thorough examination of it (not a partial one), and this examination must

be repeated once every 12 months, or the responsibility ceases." It is a matter for congratulation that American steam users are not yet threatened with similar dangers, the rates of insurance having thus far not been forced down to a figure so low as to preclude the possibility of efficient inspection.

Recent Liquid Fuel Tests in England.

We find in a late issue of the London *Engineer* several tables of results of a series of interesting experiments with liquid fuel which were carried on in Liverpool a short time ago. The arrangements for burning the oil contemplated the conversion of the oil into gas before combustion. The liquid hydrocarbon is injected by steam into the center of a retort placed in the center of the steam generator furnace; the steam and oil pass backward and forward through the retort, and become, on contact with its sides, converted into gas. The gas issues in an annular ring from front end of retort, and, striking against a deflector, returns around the outside edge of the retort, and the gas is here met with an annular blast of air, producing a hollow cylinder of flame in the inside of which is the retort, encircled with flame from end to end. The outside periphery of the flame is in close contact with the perforated refractory linings of flue, that not only become incandescent and prevent the oxidizing action of flame on the plates, but prevent a too serious reduction in the temperature of the flame. The steam is preferably kept at a temperature above 50 pounds per square inch; at a pressure below 30 pounds per square inch the steam was found to reduce the temperature of the retort very rapidly and prevent the volatilization of the liquid hydrocarbon. By a simple equilibrium valve arrangement, an exact balance of air and gas can be established, so as to produce a clear bright flame, which resembles that from purified gas. So perfect indeed is combustion that a clean sheet of note paper, we are told, held in the chimney for an hour was not in the least discolored by soot. The tests were conducted at the Hecla Engineering Works with a boiler of the marine type, and seem to have been highly satisfactory in every way.

Snow Sheds on the Canadian Pacific Railroad.

In connection with our recent short article on snow sheds on the Central Pacific Railroad, the following particulars from a correspondent at Duggan's Sidney, British Columbia, will prove interesting. They refer to similar structures on the line of the Canadian Pacific road. We quote:

It takes over 6,461,800 feet of timber to build a mile of these sheds and 62,080 bolts 36 inches long, and 200,000 spikes 10 inches long. I do not refer above to the ordinary snow sheds such as used on the Intercolonial Railway. These are used here also where snow is likely to drift in, but in speaking above I refer to what might more properly be called snow slides. They are built at a point where snow slides are apt to occur always in the face of steep and high mountains. One side (the high side of shed) is built up into the side of the mountain and has a slant over the track something like a shed roof. They are wonderfully strong, and you may be sure none too much so, as the accumulated snow of many years may start from the top of these lofty hills and come thundering down in masses 50 to 100 or 200 feet thick, with a force that nothing can resist. The snow in passing down slides over the top of the snow slide and passes on down into

the valley and on up, maybe several hundred feet up, the side of the mountain opposite. One can imagine what would be the result of such a slide striking a passenger train. Near where I am one of these slides happened. The snow came down the mountain in a body estimated to be 175 feet thick. It struck the track and carried it bodily down the mountain to the valley, across the river, that flowed through the valley, and up the opposite side to about the same height. It was where the railway track was found after the snow melted, and where it was struck. Some cars were wrecked at the same time, and were never found, probably the remains were carried down by the melting snow to the Columbia River, and then out to the Pacific Ocean.

Overhead Steam-Heating Pipes.

The usual method of heating mills in this country is by means of lines of steam pipes placed near the floor at the sides of the room. But within a few years this method of heating a mill has been to a great extent supplanted by the system of hanging pipes below the ceiling and about 5 feet from the walls. This method, says an American correspondent of *Engineering*, when adopted, received a great deal of criticism from those inclined to *a priori* reasoning, rather than that examination of facts which Bacon declares to be the foundation of sciences. It is probable that the first method of steam-heating used large cast-iron pipe hanging quite near the ceiling, but was justly abandoned on account of the unsatisfactory results, both as to heating and also to the health of persons whose heads were excessively heated in the low-studded rooms built at that time; so that the present method should be termed a renaissance rather than invention. The pipes generally used are of wrought iron, 1½ inches inside diameter, and hanging in parallel lines of four or five, suspended from about 1½ feet below the ceiling in a 13-foot room. The advantages of such a method are apparent to all who have tried them. Their first introduction was at the instance of a mill insurance interest in the United States, who recommended the trial of the method in view of certain severe fire losses caused by steam pipes. The results were of the most favorable nature, and by degrees their adoption has increased until their use is well-nigh universal. A circular letter of inquiry addressed to forty-two users of such methods of heating, through a wide range of textile industries in mills situated at various places through an extent of 7° of latitude, received only two unfavorable answers. The result of experience with this method of heating shows that the temperature of the room is kept at a greater uniformity with reduced expenditure of steam, that there is neither noise nor injury to the pipes by reason of the contraction and expansion, as is the case with low pipes held in a rigid position, that those working near benches are not subject to an excessive and fairly sickening temperature from their proximity to an excessive amount of heat radiated upon them. There is also greater convenience in manufacturing on account of the relief of the room near the floor from obstructions from steam pipes, as when placed in the usual manner.

It will be assumed in antagonism to such a method of heating, that the room is heated by convection from the air heated at the bottom, and the circulation forced in that way. But experiments, as well as the actual result, show that the method of heating is more nearly by direct radiation than by convection, and that the currents of air produced in a room by agitation of machinery and belting are far stronger and in excess of any of those merely due to convection. As confirmatory of this opinion may be cited an experiment which was

tried by rubbing the pipes of a certain room with oily waste and passing the circulation of steam through these pipes. Although the air in the room was presumed to be quiescent, as there was no machinery in motion, yet the smoke from the overhead pipes radiated in all directions, soon filling the room with smoke which appealed to all the senses in a most emphatic manner. The radiation from the pipes around the side of the room was very much restricted, owing to the obstructions from benches and articles naturally placed in front of the pipes, while the natural circulation of air in the lower corners of the room is always much more feeble than near the ceiling. Numerous thermometric observations, extending over a long time, show that the method of using overhead steam pipes heats factories more uniformly throughout different portions of the room and with an expenditure of less steam through a smaller amount of pipe. In large mill-rooms 13 feet high, 90 to 100 cubic feet are heated by one lineal foot of pipe, or in round numbers 200 to 250 cubic feet with one square foot of radiating surface; the pipes carrying steam at 1 pound to 5 pounds above the atmosphere, except early in the morning in extremely cold weather when "direct" steam is used.

Edison's New Phonograph.

Edison's new phonograph is described as follows in a recent number of the *Scientific American*:

The new phonograph is of about the size of an ordinary sewing machine. In its construction it is something like a very small engine lathe; the main spindle is threaded between its bearings, and is prolonged at one end to receive the hardened wax cylinder upon which the sound record is made. Behind the spindle and the cylinder is a rod upon which is arranged a slide, having at one end an arm adapted to engage the screw of the spindle, and at the opposite end an arm carrying a pivoted head, provided with two diaphragms, whose positions may be instantly interchanged when desirable. One of these diaphragms is turned into the position of use when it is desired to talk to the phonograph, and when the speech is to be reproduced, the other diaphragm takes its place. The diaphragm which receives the speech makes the impressions upon the cylinder. The needle by which the impressions are made in the wax is attached to the center of the diaphragm, and pivotally connected to a spring arm attached to the side of the diaphragm cell. The device by which the speech is reproduced consists of a cell containing a delicate diaphragm of gold-beater's skin, to the center of which is secured a stud connected with a small curved steel wire, one end of which is attached to the diaphragm cell. The spindle of the phonograph is rotated regularly by an electric motor in the base of the machine, which is driven by a current from one or two cells of battery. The motor is provided with a sensitive governor which causes it to maintain a very uniform speed. Motion is transmitted from the motor to the spindle by beveled friction wheels. The arm which carries the diaphragms is provided with a turning tool for smoothing the wax cylinder preparatory to receiving the sound record.

The first operation in the use of the machine is to bring the turning tool into action and cause it to traverse the cylinder. The turning tool is then thrown out, the carriage bearing the diaphragms is returned to the position of starting, the receiving diaphragm is placed in the position of use, and as the wax cylinder revolves, the diaphragm is vibrated by the sound waves, thus moving the needle so as to cause it to cut into the wax cylinder and

produce indentations which correspond to the movements of the diaphragm. After the record is made, the carriage is again returned to the point of starting, the receiving diaphragm is replaced by the speaking diaphragm, and the carriage is moved forward by the screw, as the cylinder revolves, causing the point of the speaking diaphragm to traverse the path made by the recording needle. As the point of the curved wire attached to the diaphragm follows the indentations of the wax cylinder, the speaking diaphragm is made to vibrate in a manner similar to that of the receiving diaphragm, thereby faithfully reproducing the sounds uttered into the receiving mouthpiece.

A crucial test of the capabilities of this machine was recently made at Edison's laboratory, near Llewellyn Park, Orange, N. J. A paragraph from the morning newspaper was read to the machine in the absence of the editor, and when upon our return to the instrument it was reproduced phonographically, every word was distinctly understood, although the names, localities and circumstances mentioned in the article were entirely new and strange. Another test of the perfection of the machine was the perfect reproduction of whistling and whispering, all the imperfections of tone, the half tones and modulations even, being faithfully reproduced. The perfect performance of the new instrument depends upon its mechanical perfection—upon the regularity of its speed, the susceptibility of the wax cylinder to the impressions of the needle and to the delicacy of the speaking diaphragm. No attempt is made in this instrument to secure loud speaking, distinct articulation and perfect intonation have been the principal ends sought.

The Bearing Power of Piles.

Mr. Ira O. Baker, a member of the Western Society of Civil Engineers, recently read before the society an interesting paper on the formulas for the bearing power of piles, which is published in the *Journal of the Association of Engineering Societies*. Commenting upon it the *American Architect* in a recent issue says:

It is hardly necessary to say that the calculation of the resistance of piles is one of the most unsatisfactory and uncertain processes which architects and engineers have to use. Of course there are plenty of formulas, some practical and some theoretical, but these have, as a rule, been constructed to suit different special cases, and give widely divergent results when several are applied to the same example. For instance, Mr. Baker quotes an article which gives four formulas. These formulas, applied to a given case, give results so widely divergent that the largest is 1771 times as great as the smallest. It is absurd to consider such rules as having any scientific value, and, as Mr. Baker well says, it is not creditable to the profession of engineering, or, he might have added, to that of architecture, that our knowledge of such an important subject should be in so hazy a state. We suppose that Sanders's well-known formula is that most commonly used in calculating the resistance of piles in filled land, myriads of which are driven every year in our seaport and lake cities, and experience seems to show that with hammers of about a ton weight, and a sinking at the last blow of 2, 3, 4 or 5 inches, its results are tolerably accurate indications of the maximum safe resistance of the pile, but under other conditions it is nearly valueless.

Mr. Baker gives a striking comparison of the actual results obtained by testing a pile with those derived from the formulas of various authors. The pile was driven with a hammer weighing 910 pounds, falling 5 feet and sank $\frac{3}{4}$ inch at the last

blow. By Sanders's formula it should have been capable of supporting safely a load of 18,200 pounds; by Rankine's, of 128,000; by Haswell's, of 72,000; by Nystrom's, of 9000, and by Weisbach's, 111,000. On loading it was found to bear 59,618 pounds without moving, but sank very slowly on the addition of less than 3000 pounds. What should be the factor of safety in such cases it is impossible to say, and Sanders's which would be about three, might not be excessive. Mr. Baker himself gives the formula, derived from analysis $P = \sqrt{2q + Wh^2/d^2} - qd$ in which W is the weight of the hammer, h the height from which it falls in feet, d is the sinking at the last blow also in feet, and q is a co-efficient to be determined by experiment, but which in many cases is about 6000. Of course this is only suggested as an attempt to "contract a little the limits of the unknown and uncertain," but it is at least interesting. One observation which Mr. Baker makes is of much importance. The record of driving piles in various places shows that a great difference in the effect of the impact of the hammer results from the "brooming" of the head of the pile. In one case after the head of a pile which had become badly broomed was adzed off the efficiency of the succeeding blows was nearly four times as great as before the adzing, and this should form a very important factor in determining constants for practice.

Quadruple Expansion Engines.

Quadruple expansion engines have recently been brought into use on the screw steamer *Kron Prinz Friedrich Wilhelm*, one of the large fleet owned by the North German Lloyd Company. The new cylinders, boilers, &c. were shipped to Bremerhaven, where they were fitted to the old engines by the workmen of the owners.

The dimensions of the steamer are: Length, 318 feet; breadth of beam, 39 feet 6 inches; depth, 31 feet. Prior to her conversion she had a pair of engines constructed on the old system, the cylinders being 48 inches and 88 inches in diameter, with piston stroke of 48 inches; and the steam that was supplied to them was of 60 pounds pressure, and generated in four single-ended boilers. In their converted form the engines have cylinders of 21½ inches, 30½ inches, 43 inches and 61 inches in diameter, respectively, with piston stroke the same as formerly. They are supplied with steam of 170 pounds pressure from two double-ended boilers, which have a heating surface of 4338 square feet, and a grate surface of 173 square feet. Steam and hydraulic starting-gear is also provided. The circulating pump in the old engines has been done away with, and its place is filled by one of Messrs. Gwynne's patent centrifugal pumps. The trials of the steamer with her converted engines took place on the Weser in the early part of November, when results were obtained which cannot but be regarded as highly satisfactory. Tested on the measured mile, and between the lights, the *Kron Prinz* maintained a mean speed for six hours of 13.19 knots, which is a considerable increase over her previous performances. At the same time trials were made of the consumption of fuel, the results of which thoroughly satisfied the representatives of the Norddeutscher Lloyd Company. During the trials the engines indicated about 1700 horse-power. In consequence of the greatly increased economy of the engines now in use on board the *Kron Prinz*, the owners have been able to convert a considerable portion of the coal bunkers into cargo-carrying space.

In an interview published in a Pittsburgh newspaper, the superintendent of the H. C. Frick Company is reported to

have said: "Last month we shipped a total of 10,117 cars, 2280 going to the North Chicago Rolling Mill and 2443 to the Edgar Thomson Steel Works. This leaves a balance of 5494 cars for the market, or about 1200 more than the total output of both McClure & Co. and Schoonmaker & Co."

The Westminster Clock.

The Westminster clock, of which a number of illustrations were recently published in the *London Graphic*, is believed to be the most powerful in existence. It drives the hands of four dials, each 22 feet, 6 inches in diameter, strikes the hours on a bell weighing 13½ tons, and chimes the quarters on four bells, weighing together about 8 tons, and it performs this work with marvelous accuracy. Its reputation as a timekeeper is unrivaled and well deserved. This year it has surpassed all its previous performances, its accumulated error in 134 days having been less than four seconds, giving a mean variation of less than one second in a month, and this continuous during more than four months. For 17 consecutive days it went without any perceptible variation whatever. The pendulum, the time measure, is about 15 feet in length, and has a bob weighing about 700 pounds. It is, of course, compensated for variations of temperature, zinc and iron being the metals employed. These are so disposed that the greater expansion of the zinc in any increase of temperature nullifies the lesser expansion of the greater length of iron, the actual expansions of the two metals being equal, but acting in opposite directions. The escapement of the clock, which gives impulse to the pendulum, and so keeps it in motion, is that known as Denison's double three-legged gravity. The advantage of this form of escapement is that it gives to the pendulum an impulse not subject to any variations such as would be caused by mechanical imperfections in the wheel works, or from the action of the wind on the long hands, or differences in the friction produced by changes in the condition of the oil, any of which would tell on the going of the clock. The driving weight of the going part of the clock is comparatively small, being about 1½ cwt. This, falling about 200 feet, is sufficient to keep the clock going for eight days. It is wound up once every week. The striking parts are much more ponderous. The hammer, which at present strikes on the hour bell ("Big Ben"), weighs about 4 cwt., but at one time a much heavier hammer was used. The weights of the hour-striking part and of the quarters weigh about three tons. These weights have a fall of about 200 feet to keep the clock striking four days only. At one time these were wound twice each week, but the work is very laborious, and, to ease the men employed, the striking parts are generally wound three times each week. The striking is effected with very great precision, the first blow of the hour being struck at Greenwich time.

The clock is still under the care of its makers, Messrs. E. Dent & Co., of 61 Strand, London, who pride themselves on its accuracy. Time signals are sent to the clock tower from the Royal Observatory at Greenwich, for the purpose of enabling the attendants to verify the performance of the clock, which in its turn reports itself twice daily to the Astronomer Royal, under whose direction a record of its going is kept in the books of the Royal observatory. The clock was erected in the tower in 1859. It is, of course, stopped at intervals of about four years, for the purpose of cleaning, and last year, when it was taken to pieces, its condition, after 28 years of going, was found to be unimpaired, the only part showing any signs of

wear being the auxiliary wheels used to facilitate the winding. Many years will probably elapse before even these will require to be renewed, and when this happens it will not even be necessary to stop the clock.

The dials, as we have said before, are 22 feet 6 inches in diameter, over 70 feet in circumference; the strokes or dots indicating the minutes are therefore 13 inches apart, so that the point of each of the minute hands travels over a distance equal to about $\frac{1}{4}$ mile every day. The hour bell is heard all over London, but, of course this depends on the condition of the atmosphere, the wind carrying the sound in whichever direction it happens to be blowing.

The dials are illuminated, and mechanism was provided in the clock for the purpose of raising and lowering the gas, which was always kept burning, but it was found more economical to turn it off entirely during the day, and therefore it is now lighted each evening by an attendant.

Endless Railways.

The old problem of fitting the wheels of carts and other vehicles with appliances by means of which heavy loads may be readily carried over soft or sandy roads, has, of late, been regarded with renewed attention. One of the devices which has more recently been brought forward to accomplish the object is a new form of endless railway invented by Mr. William Fender, of Buenos Ayres.

The attempt has been made many times, and notably in 1854 by Boydell, whose self-moving engines were employed with some success in the Crimean war for transporting artillery over land which was otherwise impassable. Boydell's system, however, failed, owing to excessive wear and tear and to its complicated construction. Mr. Fender's endless railway consists of a chain formed of a series of flat pieces 17 inches long and 13 inches wide made of hard-wood riveted between two thin steel plates and linked together. They are alternately concave and convex at the ends to admit of free lateral play. This chain is placed round a wheel, than which it is wider and larger in diameter. The three bottom plates rest on the ground beneath the wheel, and the rest of the chain hangs loosely round two angle-iron rings which are free to revolve around the wheel, being kept in position by means of clips bolted to the rim of the wheel. The chain itself is restricted from undue lateral movement by means of sheet-iron side plates fastened to radial arms secured to the axle, which, in this case is fixed, the wheel revolving on it. As the wheel revolves, it moves along the bottom plates of the chain and brings the next plate into position without any undue strain or friction. The system, we understand, is being introduced into England, and is also being successfully used in carting over swampy land in Germany.

The city of Montreal is putting in position powerful engines and erecting costly pumping stations at various points to protect property from floods in the St. Lawrence River. One of the stations is designed to rid the city of its sewage. The essential features of the work are: An iron penstock gate, to be closed when the river is at flood; the sewerage dammed up by the closing of this gate to be conveyed to the pumping station by a brick flume and distributed by six smaller flumes to the four centrifugal pumps that have a combined discharge of 72,000 gallons per minute. The sewage will be raised by these pumps 15 feet and discharged into the same sewer from which it was pumped at the other side of the penstock gate.

The motive power will be two pair automatic engines of 300 horse-power each, manufactured by Laurie & Brother, of Montreal. Permanent dykes are also being constructed.

Special Iron Tariff.

At a meeting of the Standing Committee of the Joint Committee held December 29, at which representatives of the roads particularly interested in the transportation of iron were present, it was concluded that it would be necessary to issue a special tariff on certain articles of iron and steel manufacture, and it was agreed that a special tariff be made on the following articles on the basis of 25 cents per 100 pounds in carloads, and 30 cents per 100 pounds on less than carloads between Chicago and New York, to apply both eastbound and westbound, taking effect January 9, 1888, subject to the rules and regulations as provided by the official classification. It was also resolved that no articles shall be added to those named below by any company or local committee unless the addition is first authorized by the Joint Committee under their rules:

Anchors.
 Anvils.
 Axles, iron or steel, NOS.
 Axles, car.
 Band or hoop iron, OR damage by wet.
 Bar or boiler iron.
 Beams and channels.
 Billets and blooms, iron or steel, LCL.
 Billets and blooms, iron or steel, per gross ton of 2240 pounds, same as 2000 pounds CL.
 Bloom ends, billet ends, crop ends, iron or steel, in packages, LCL.
 Bloom ends, billet ends, crop ends, iron or steel, per gross ton of 2240 pounds, same as 2000 pounds, CL.
 Boiler flues or plates.
 Bolts, nuts, rivets, staples or washers, iron, in boxes or kegs.
 Brake shoes, iron.
 Bridge iron 30 feet long or under.
 Bridge iron over 30 feet long. (See Rule 5.)
 Bumpers, iron.
 Cabinets, pneumatic, iron.
 Car springs.
 Car wheels.
 Castings, iron, NOS, each weighing 100 pounds or over, but less than 5000 pounds each.
 Castings, iron, NOS, in barrels or boxes, OR.
 Castings, furnace.
 Castings, iron, broken.
 Castings, malleable iron.
 Castings, steel.
 Chain, cable.
 Chain, iron, in barrels or casks.
 Chain, iron, loose, OR.
 Chairs, railroad, iron.
 Corrugated iron, OR damage by wet.
 Corrugated or galvanized sheet iron, OR damage by wet.
 Cotton ties, iron.
 Cotton tie buckles, in barrels or boxes.
 Crow bars, iron.
 Cultivator teeth, in packages, LCL.
 Cultivator teeth, CL.
 Draw bars, iron.
 Draw heads, iron.
 Drums, casks or tubes, iron, empty, returned, having passed over the road filled. (See Rule 19.)
 Fence posts, iron, cast or wrought, OR wet and rust.
 Fire plugs.
 Fish plates, railroad.
 Flanges, wheel, iron, in bundles.
 Flues, iron.
 Forgings, iron.
 Frogs, railroad.
 Furnace parts, iron, CL.
 Furnace parts, iron (except galvanized sheet iron parts), LCL.
 Galvanized iron, OR damage by wet, released.
 Gas-pipe, iron.
 Grates. (See Rule 3B.)
 Grate castings, iron.
 Harrow teeth, in packages, LCL.
 Harrow teeth, CL.
 Hoop iron, OR damage by wet.
 Horse, mule or ox shoes, in kegs.
 Iron, angle, skelp and tank.
 Iron, hollow-ware. (See Rule 3B.)
 Links and pins, iron.
 Locomotive tires.
 Nails or spikes, in kegs.
 Nails or spikes.
 Nails in kegs will be taken at an estimated weight of 100 pounds per keg.
 Nails, horseshoe or finishing, in boxes.
 Nuts, iron, in boxes or kegs.

Nut locks, iron, in packages.
 Ore, iron, CL.
 Picks, in barrels or boxes.
 Pig iron, LCL.
 Pig iron, sand, per gross ton, 2268 pounds, same as 2000 pounds, CL.
 Pig iron, Chili, per gross ton, 2240 pounds, same as 2000 pounds, CL.
 Pipe, galvanized.
 Pipe, cast iron.
 Pipe, wrought iron, in coils, loaded in box cars.
 Pipe, wrought iron, NOS.
 Plates, plow points and wings.
 Rake teeth, in packages, LCL.
 Rake teeth, CL.
 Railroad iron, LCL.
 Railroad iron, per gross ton, 2240 pounds, same as 2000 pounds, CL.
 Rods, wire.
 Rods, iron.
 Roofing, iron, in boxes, bundles or rolls.
 Sash weights.
 Screws, iron, in boxes or kegs.
 Shafting, wrought or cast iron, in boxes not over 30 feet long.
 Shafting, wrought or cast iron. (See Rule 5.)
 Sheet iron, OR damage by wet.
 Slabs.
 Sledges, iron, in boxes or casks.
 Spiegel iron or spiegeleisen, LCL.
 Spiegel iron or spiegeleisen, per gross ton 2240 pounds, same as 2000 pounds, CL.
 Spikes, railroad.
 Splices, railroad.
 Springs, carriage seat or wagon.
 Steel, in boxes.
 Steel, in bars, bundles, plates or slabs.
 Stoves. (See Rule 3B.)
 Stove plates. (See Rule 3B.)
 Stove furniture, iron. (See Rule 3B.)
 Switches, railroad.
 Switch stands, railroad.
 Toe calks, iron, in boxes or kegs.
 Tubing, iron.
 Tuyeres, iron.
 Water gates.
 Water pipe, iron, OR.
 Wedges, iron, in boxes and casks.
 Wheel flanges, iron, in bundles.
 Wire, barb, OR, wet and rust.
 Wire, binding, or wire ties, OR, wet and rust.
 Wire, fence, OR, wet and rust.
 Wire, coppered, galvanized or steeled, OR, wet and rust.
 Wire, iron, in boxes or casks, OR, wet and rust.
 Wire, telegraph, common, OR, wet and rust.

ALBERT FINK, Chairman.

G. R. BLANCHARD, Western Vice-Chairman

Locomotive Brass Castings.—One of our English exchanges gives the following as the proportions of the different metals used for brass castings in a prominent English locomotive works: Brass for side rods, 6 pounds of copper, 1 pound of tin; to 100 pounds of this mixture add $\frac{1}{2}$ pound of zinc and $\frac{1}{2}$ pound of lead. Brasses for driving boxes, the same as for side-rod brasses. Some master mechanics prefer harder brasses and call for 5 pounds of copper and 1 pound of tin, $\frac{1}{2}$ pound of zinc and $\frac{1}{2}$ pound of lead. Bells, 4 pounds of copper and 1 pound of tin; to every 100 pounds of this mixture add $\frac{1}{2}$ pound of zinc and $\frac{1}{2}$ pound of lead. Castings subjected to steam pressure, 20 pounds of copper, $\frac{1}{2}$ pounds of tin, 1 pound of lead and 1 pound of zinc. Pumps and pump chambers, 8 pounds of copper, 1 pound of tin; to every 100 pounds of this mixture add $\frac{1}{2}$ pounds of lead and $\frac{1}{2}$ pounds of zinc. Piston packing rings, 16 pounds of copper, 24 pounds of tin; to every 100 pounds of this mixture add 1 pound of zinc and 1 pound of lead.

The French nation, characterized by its enterprise in engineering and scientific fields, has executed an interesting feat. A torpedo boat was to be taken from Toulon to Cherbourg. Such vessels have proved anything but comfortable, or even safe, sea boats. Strength, seaworthiness and accommodation—all are put aside in their construction in order to attain the highest speed. The land route, therefore was tried, and the trial was a complete success. Without the least damage, the transportation was accomplished. The delicatessides, less than $\frac{1}{4}$ inch in thickness, were uninjured. The vessel rested on a simple cradle, and was taken on the regular railroad. We cite this experiment as of special interest at the present time.

An Economical Method of Heating and Ventilating an Office and Warehouse Building.*

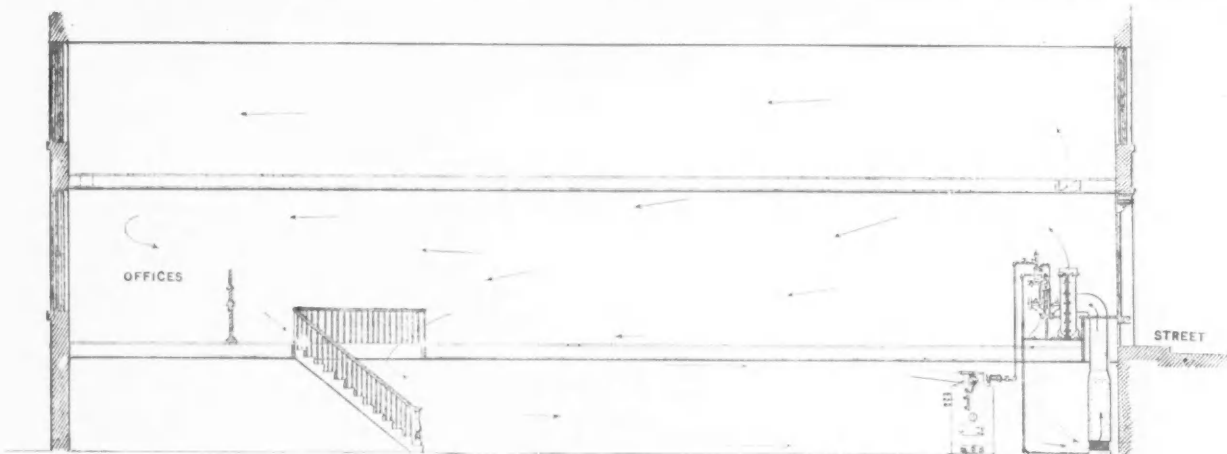
Various methods have been devised and are in use for heating large rooms, manufacturing and public buildings. Some of them take into consideration the ventilation of the buildings as well. I will describe briefly a method I have had in use in my store at 135 North Third street, Philadelphia, Pa., for the past two winters, which has been very satisfactory. It has been very economical, and dependence could be placed upon its efficiency at all times, no matter what the condition of the weather might be. A reference to the accompanying sketch will clearly give a correct understanding of the arrangement. An exhaust fan driven direct by a small upright engine is connected with a "patent air-heater" placed in the basement at the front of the store by an 18-inch galvanized pipe. An upright boiler in the basement furnishes steam to run the engine; the exhaust steam from the engine is delivered through the exhaust-pipe into the base of the air heater on one side, and

no openings. The front is almost wholly of glass, and the large windows are hinged, and open or close like a door. They are not very tight. About three-fourths of the wall surface of the back end is composed of glass; the rest of brick. The building is five stories and basement, and I only occupy and heat the first and second stories and basement, but I think I could easily heat the whole with my apparatus at a very little increase of cost in fuel. The engine that drives the fan is 3 inches in diameter and has 3 inches stroke. The wheel in the fan is 36 inches diameter and 13½ inches wide at the outlet of wheel; the area of discharge of blower is 1.76 square feet and the inlet is same size. The heater is about 3 feet wide, 6 feet 6 inches high and 20 feet deep, and filled with 588 feet of 1-inch steam-pipe. I am so well satisfied with the results I get from this apparatus that I have not made any close and accurate experiments of what I can do with it. I know from the cost of my fuel that the expense of heating all I occupy is about the same as I formerly paid when I only heated the offices, which were partitioned from floor to ceiling and heated with open grate. I might return the con-

between the temperature at the top of a room similar to the one above described and at the bottom. A room 13 feet high heated with furnaces or radiators will at times be 25° warmer at the top than near the floor. When the air is more uniformly mixed, as it is with a blower, a less expenditure for fuel will be the result and more agreeable conditions realized.

Sheet Metal Power-Press Improvements.

G. A. Crosby & Co., manufacturers of presses and dies for sheet-metal workers, 259 to 263 Randolph street, Chicago, have added some valuable features to their power-presses, among which is their automatic knock-out. In many cases, where long and deep edges are required on the work, the old system of using wire springs for throwing the stock out of the upper die has been found to act unsatisfactorily and imperfectly. The aim of this new positive knock-out is to supply a discharging force, perfectly independent of springs, and which, from the principle of its construction, must be absolutely positive at each



SECTION OF BUILDING SHOWING METHOD OF HEATING AND VENTILATING.

the drip and condensed steam is conveyed away through a pipe at the other. The exhaust steam of the engine furnishes all the heat usually used, but, as a precaution, and for use early in the morning, in extremely cold weather, or for use in very moderate weather, in the middle of the day, when it is unnecessary to run the engine, a small live-steam pipe is connected with the base of the heater. The fan runs at a very low speed, and is perfectly noiseless. In my case no conducting-pipes for the distribution of the air are necessary, and the variations of temperature in different parts of the store are not observable with the ordinary commercial thermometer. By examining the sketch it will be seen the store itself becomes one large conducting tube—and the air is used over and over again, enough fresh air coming in through openings around the windows and through doors constantly being opened. An opening near the bottom of the heater has been provided, and can be used for supplying fresh air when greater ventilation and less heat are required.

The following data are submitted: Length of store, 95 feet, width of store, 24 feet; height of basement, 8 feet 6 inches in the clear; height of first or main floor, 13 feet in the clear; height of second floor, 11 feet 6 inches in the clear.† These walls are brick, inside walls plastered, and have

condensed water from the heater to the boiler and make a greater saving. This is not done at present.

Possibly before the meeting of the society we may have some cold weather requiring the use of the apparatus, and if this paper produces any discussion by the members some careful experiments upon its performance may be laid before them; but at present I can give only the results of one imperfect and incomplete observation made during December, when the outside temperature was 45°. Temperature of the air on its return and just before entering the heater, 59°. Temperature of air issuing from the mouth of the blower after passing through the heater, 112°. Average temperature of air in the room of the main store on first floor, 75°. Pressure of steam in the boiler by gauge, 40 pounds. Revolutions of blower, 113 per minute. I have made arrangements by which I can measure the evaporation of boiler, condensation by the heater, steam pressure at cylinder and temperature at various places in the rooms, but to put them in operation I require another element, which I can only obtain later in the season—viz, cold weather. I have no apparatus which will give more heat units than contained in the steam, but I do think I have one which will utilize those obtained to the greatest advantage, and one that will work when I want it to, and as I want it to, independent of atmospheric condition even when the winds blow where they list. One self-evident advantage must be apparent from the better distribution of the heat throughout the room, having a much less difference

stroke of the press. With this knock-out it is impossible for the operator to allow two thicknesses of stock to become wedged into the punch at one time, which is so often the cause of serious annoyance and damage when springs are used, especially when they become worn and weakened. When used in connection with the single-acting combination dies made by this firm, the knock-out effects a considerable saving in spoiled stock, and consequently insures an increase in the quantity and quality of the work. Another important attachment is the automatic friction-brake, which acts in such a manner as to resist the force of the bumper or drawing ring, from the time the punch and cross-head start upward until they leave the drawing ring, which is usually about one-quarter of a revolution of the shaft, thus leaving about three-quarters of a revolution open or free from friction or use of power. These attachments, we understand, can be put on the majority of the presses made by the firm.

Blistered Boiler Plates.—Many of the plates reported as blistered in our monthly statement of defects, remarks the *Locomotive*, are in reality laminated plates found in new boilers, generally at the time the hydrostatic test is applied when the boiler is finished. A laminated plate only needs the application of a little heat to blister it, and the two may be considered one and the same thing. Lamination, which leads to blistering, is due to imperfect welding of the different layers of which iron plates are made up, and is never found in steel plates. The very best iron plates sometimes blister, even those made of the best material, and

* By Henry I. Snell.—Presented at the Philadelphia meeting of the American Society of Mechanical Engineers.

† This floor I only heat occasionally, as it is used principally for the storage of machinery. When necessary to heat it I open the damper shown directly over the mouth of the blower, and sufficient heated air will be driven through the opening to heat it comfortably in a few minutes.

which have been made with the utmost care. This is due to the fact in rolling plates, as in every other kind of work where iron has to be welded, an imperfect weld will sometimes result, in spite of any amount of care and skill. Where the lamination exists at the edge of a plate, it should always be seen during the construction of the boiler, and if of considerable extent the plate should be rejected. But unfortunately this is not always the case. The lamination is more apt to be somewhere away from the edge of the plate, than anywhere else, and then its detection is difficult and in most cases impossible, until it begins to blister under the influence of heat. The treatment of a blister depends entirely upon its character and size. In the majority of cases judicious trimming at the proper time will be the only thing necessary. In other cases the lamination is so deep and extends over so large a surface that the entire sheet has to be removed.

Improvements in Gas Lighting.

The general introduction of electric lighting, we venture to say, has been the cause of numerous improvements in gas-lighting methods, for the competition brought about between the two systems made it necessary to increase the efficiency of gas as an illuminating agent if it was to hold its own against its younger rival. One very noticeable effect was the reduction in the price of gas, which was a simple way to increase its efficiency on a basis of dollars rather than of cubic feet. There is a minimum limit, however, at which gas can be profitably manufactured, and when that is reached increased efficiency must be sought in the direction of better quality or improved forms of burners. One source of economy is heating the gas before it is burned, thus producing a white flame. This principle, which is not novel, is applied in several ways and with varying success. Another general form of improvement which has received considerable attention lately is to more fully utilize the heat of combustion of the gas, with a view to increasing its illuminating power. This idea has been applied in a number of different ways. The essential feature consists in thoroughly burning the gas so as to make a very hot flame through one of low illuminating power. The heat is then converted into light by putting some refractory substance in the flame and heating it to incandescence. Besides producing greater whiteness and brilliancy, such a light has the further advantage of perfect steadiness, the want of which is such a serious fault with ordinary gas burners. Some of our readers are perhaps familiar with the burner in which combs of incombustible material were highly heated in a gas flame. A later invention of this nature in the Welsbach incandescent gaslight in which the incandescent body, which is termed the mantle, consists of a small cone of incombustible matter, in the shape of fine gauze. When heated to incandescence over a small Bunsen burner the mantle emits a brilliant light. As the mantle is incombustible it remains intact, and does not change in any manner until after several hundred hours' use. The mantles are woven from cotton thread and are dipped in chemical solutions, the ingredients of which are the oxides of zirconium, lanthanum, thorium and cerium, which form a coating around the filaments. The mantles are next suspended in the flame of a Bunsen burner, which destroys the cotton and leaves a skeleton of incombustible material. The mantles are also made of two different tones, one of which gives a pure white light and the other a faintly yellow light, the latter being used for domestic and general lighting.

Structural Stiffness.

In a recent issue the London *Engineer* remarked it to be a noteworthy fact that no material, not even the hardest steel, has, if left unstressed, any initial rigidity of stiffness. Put into other words, this means that every material suffers some deformation from every stress to which it is submitted, however small. An admirable example of this is supplied by the mirrors of reflecting telescopes. These are composed of an alloy of tin and copper, extremely hard, rigid and brittle. Lord Rosse used for his great telescope a mixture of 32 of copper to 14,911 of tin, or four atoms of copper to one of tin. The resulting speculum metal is very brilliant, and has been described as "perhaps the most intractable among metallic bodies, so brittle that it breaks, even in large masses, with a slight blow or change of temperature, and so hard and friable that it cannot be wrought with tools of steel." Apparently a mass of this alloy, 3 or 4 inches in thickness and of moderate diameter, ought to be initially stiff if anything is. Yet it is well known that the most extreme precaution must be used in mounting a speculum or it will become distorted by its own weight. "To many," says Nicholl, "it will seem incredible that a disk of this hard and rigid metal, from 4 to 6 inches thick, can bend save except under some force purposely applied; while the fact is that it requires the most refined mechanical contrivance to prevent injurious flexure from its own weight. Even a 9-inch one, if resting on a ring at its circumference on three screws, or, according to the old plan, pressed by springs against three stops, bearing on its edges, loses its defining power." An example more familiar to engineers is that supplied by some of the large horizontal cylinders used in the old low-pressure days in the navy. It was found that, notwithstanding the use of ribs and stiffening webs, such cylinders underwent sufficient distortion to become perceptibly oval when laid on their sides if they were bored out in a vertical position.

The specifications for the great tunnel under the lake at Cleveland, to be commenced next spring, set forth the following requirements: The total length of the tunnel will be 8850 feet, and it will be nearly cylindrical, 7 feet and 2 inches high and 7 feet wide. The wall will be of brick and 12 inches thick. Hydraulic cement mortar will be used as a lining. The tunnel will have a capacity of 110,000,000 gallons. There will be six shafts, including the pumping wells. The shafts proper will number only four—one in the crib, one at the shore of the lake, one for future extension and one in the pump-house yard. The tunnel will be 70 feet below the surface of the lake, and its average depth below the bottom of the lake will be about 30 feet.

About January 15 freight rates from Pittsburgh to San Francisco, Los Angeles, Stockton, San Diego, Portland and all California points will be advanced by all transcontinental lines. The rates on glassware, window-glass, nails and all kinds of manufactured iron will be advanced 9 cents per 100 pounds. The new rates will be: First-class, \$3.60; second, \$2.80; third, \$2.25; fourth, \$1.98; fifth, \$1.62; sixth, \$1.44; seventh, \$1.26; eighth, \$1.17; ninth, \$1.08. These rates are governed by the Pacific Coast classification.

The Altoona shops of the Pennsylvania Railroad are now constructing gondola cars of 60,000 pounds capacity. Fifty cars daily is the output already attained. The greatest change over the old style of cars is in the trucks. They will be lowered several inches and each be supplied with

three sets of wheels. In height the new gondolas will almost equal that of a box car. The managers of the road are confident that by means of this massive rolling stock the car famine will soon be made a thing of the past. The entire locomotive department of the Altoona shops is now employed in constructing engines of the "R" class. Their weight is 136,000 pounds, and they have the largest boiler surface of any engine built in the world. Every day sees a new one turned out of the Altoona shops.

Railroad Stock-Watering.

The report of the Pacific Railway Commission appointed by act of Congress to investigate the accounts and methods of certain railroad corporations which have received aid from the Treasury of the United States makes some startling statements respecting the enormous profits realized by watering stocks. Ex-Governor Pattison, of Pennsylvania, representing a minority of the commission, recites the history of the grant subsidy bonds amounting to \$64,623,512 to the six railroad companies which formed parts of the original scheme of communication between five points on the Missouri River and the Pacific Ocean. It gives the figures showing the payment of interest for 30 years by the Government on these bonds, amounting to \$114,261,247; the grant of 26,000,000 acres of land to the railroad companies, on which they have realized \$39,479,213.71, with lands worth \$26,000,000 yet unsold; the receipt by the companies of aid from other sources, amounting to \$3,070,877, and the further advantage of \$199,790,250, representing the value of the use of the Government's annual advances of \$3,877,410, which it does not require the companies to repay until the maturity of the subsidy bonds in 1895-99. In a table entitled "Cost and Capitalization," the commissioner says: The six roads were built for less than \$96,000,000, yet bonds and stock were issued for \$268,302,462, as follows:

	Cost.	Bonds and stocks.
Union Pacific.....	\$28,824,000	\$190,814,812
Kansas Pacific.....	11,800,000	25,028,250
Central Branch.....	2,731,347	4,200,000
Sioux City and Pacific.....	2,600,000	5,047,720
Central Pacific.....	36,000,000	
Western Pacific.....	4,000,000	124,211,680
Totals.....	\$85,955,347	\$268,302,462

The commissioner finds that large sums were applied by each of the companies to improper purposes; that the four men who controlled the Central Pacific diverted the earnings of that company, through contracts made by themselves with themselves for construction, leases and repairs, and divided over \$142,000,000 in cash and securities; that they built 1171 miles of adjunct lines, and, as directors of the Central Pacific Railroad Company, took leases of their own lines from themselves for the Central Pacific, at the rate of nearly 13 per cent. per annum; that 15 months ago three of these directors contracted with themselves to build an extension of the California and Oregon division of the Central Pacific, a distance of 103 miles, the actual cost of which work was \$3,505,609, while they paid to themselves \$8,000,000 in stock and \$4,500,000 in bonds, personally profiting by that single transaction to the extent of \$4,834,391. As directors of the Central Pacific they also loaned the funds of that company to themselves to build the Southern Pacific, a competing line, across the continent. The present status of the Government debt is also reviewed in detail, and the assertion is made that "at present prices of railroad construction it is evident that from the properties themselves the Government cannot recover within \$108,000,000 of the present value of the indebtedness owing to it by the bond-aided companies."

Contrasting Methods of Building in Great Engineering Works.

According to the *American Architect*, M. Max de Nansouty, editor of *Le Génie Civil*, writes for that journal a rather striking comparative notice of the methods in use in the construction of what may be called the two rival aspirants for the place of the greatest works of engineering in the world—the Forth Bridge and the Eiffel Tower at Paris. The former of these gigantic structures is now well advanced. The foundations of the piers are in place, and the enormous cantilever arches, 1700 feet each in clear span, already tower far above the water of the estuary. As is well known, the cantilever construction requires no staging or “false works,” and the main piers being now practically complete, nothing more is necessary but to build out from these until the corresponding portions of the two cantilevers meet over the middle of the abyss. In doing this M. de Nansouty observes that numerous drawings are kept on the ground; the pieces of iron are brought from the shops in a very unfinished condition, and are, after arriving at the work, trimmed, drilled, reamed and fitted with considerable trouble, to make them correspond with the drawings and occupy properly their destined places, while gussets and patches are cut out and drilled on the spot. All this is, of course, perfectly legitimate and perhaps necessary, but M. de Nansouty is much impressed with the contrast between the noise and bustle involved in this way of doing things and the quietness with which the Eiffel tower is constructed. In the French work there is absolutely no fitting, trimming or drilling. Even the use of a drift-pin or a reamer to bring into accord two rivet holes not punched exactly in the right place is forbidden, and the workmen have strict orders to return to the shop every bar, rod or angle iron which does not exactly fit its intended place when received.

Of course, such accuracy as this requires great care in laying out the drawings for the work, and, in fact, in the shop at Levallois-Perret, the countless drawings have all the dimensions shown upon them figured by calculation to four places of decimals, the greatest error permitted in the figures being $\frac{1}{10}$ mm., or about $\frac{1}{300}$ inch. Of course pieces made in this way come together like the parts of a watch, and every portion is numbered and labelled, so that there can be no mistake as to its proper position, and the handling of huge detail drawings on the ground is unnecessary. The work of setting up being thus reduced simply to riveting, it is only necessary to keep a small gang of men employed, and the huge tower grows rapidly, but silently. In regard to the rumors which have been spread from time to time, to the effect that the men engaged on the tower had shown so much terror at being obliged to work so high up in the air that the project was about to be abandoned, M. de Nansouty remarks that these apprehensions have arisen only in the imaginations of persons ignorant of the subject. To the men themselves the idea that it made any difference whether they worked one foot or a 1000 feet above the ground would appear exquisitely ridiculous, long practice having given such persons abroad, as it does to bridge-building gangs here, nerves proof against dizziness under any circumstances.

Rope Transmission in England.

According to the *London Engineer*, a fly-rope apparently was first used in England in 1863, by Mr. Ramsbottom, for driving cranes at Crewe. These ropes were $\frac{3}{4}$ inch diameter when new, of cotton, and weighing $1\frac{1}{2}$ ounces per foot. They lasted

about eight months, and ran at 5000 feet per minute. The total lengths of the rope were 800 feet, 320 feet and 560 feet. The grooves in the pulley were V-shaped, at an angle of 30° . The cord was supported every 12 feet or 14 feet by flat pieces of chilled cast-iron. The actual power strain on the rope was about 17 pounds, and the ropes were kept tight by a pull of 109 pounds put on by a jockey pulley. Rope-gearing is now superseding belting and gearing in cotton mills. It has long been used in South Wales for driving helve hammers in tin-plate mills. The ropes are usually about $5\frac{1}{4}$ inches to $6\frac{1}{4}$ inches in circumference, of hemp. The diameter of the pulleys should be at least 30 times that of the rope, and the shafts should not be less than 20 feet apart. A $6\frac{1}{4}$ -inch rope is about equivalent to a leather belt 4 inches wide, running at the same speed—3000 feet per minute. Such a rope will transmit 25 horse-power. The coefficient of resistance to slipping of a rope in a groove is about four times that of an equivalent belt.

Grinding Mills.

The Foos Mfg. Company, of Springfield, Ohio, are putting on the market a number of different styles of what they call their “Scientific” mills for grinding cobs or grain of any kind, and for which a number of advantages over existing types are claimed. Perhaps the principal feature of the mills is found in the grinding plates which are made in sections (six in all, three on the running and three on the still plate). These sections, three at a time, are put in a machine built especially for this purpose, and ground on the back to a perfectly true and accurate bearing, and then are bolted to castings or heads (which are first carefully balanced), each section having three bolts which are held in place by nuts, each nut being securely held in place by a nut lock, so that it cannot possibly work loose or get into the mill. The nut locks can easily be taken off with a chisel, when the bolts can be taken off and the sections removed and replaced when worn. Each set of plates is ground alike so that extra plates can be put in any mill of proper size in a short time and with little trouble and by any one of ordinary skill and intelligence.

The plan adopted in the plates is that of gradual reduction.

First, there are large ribs on the plates close around the shaft which lack less than 1 inch of coming together; these do the first work and break the grain in two or three pieces. Then come numerous small A-like figures, which stand nearly one-fourth of an inch above the surface of the plates. These have sharp edges and cut the grain as it passes from one to the other. Then comes a ring of fine reversed inclines, extending entirely around the outer edge of both running and still plate. These take the grain, now reduced to small, gritty particles, and, by rubbing, reduce a portion of the product to a soft, floury meal. The A-shaped projections must wear down to the surfaces of the plates before they become useless. The figures are alike on both sides, and when one side is used in grinding the other side remains untouched. When one side, therefore, becomes worn, the mill can be run in the opposite direction by crossing the belt and changing the spout, bringing into action the fresh surfaces. As these are used the action of the grain, it is claimed, sharpens the dull side, the plates thus being self-sharpening.

The crusher on the shaft has lugs which have angles, the crusher the nature of a conveyor, so that the grain and broken cobs are carried to the grinding plates. This is held securely in position on the shaft, without the use of any bolt, set-

screw, key-seat or pin. In order to prevent accidents from bolts, set-screws, &c., getting into the mills, a pin breaker is used. This consists of a wooden pin holding one side of a yoke which holds the temper screw regulating the feed. Any hard substance coming between the plates will break this pin and allow the plates to run apart. It works automatically and requires no watching or attention whatever. The plates are so arranged as to permit an opening of 1 inch.

The mills throughout are presented as of a high class of workmanship, and have thus far given most satisfactory results.

Deep Wells.

According to recently published figures the deepest well drilled in the United States is that of George Westinghouse, at Homewood, near the city of Pittsburgh, which, on December 1, 1886, had reached a depth of 4618 feet, when the tools were lost and drilling ceased. The Buchanan farm well of the Niagara Oil Company, drilled by Frederick Crocker, in Hopewell Township, Washington County, is 4303 feet deep. The Rush well, of the Niagara Oil Company, in Washington County, was abandoned at 3300 feet. The deep well of Jonathan Watson, near Titusville, was drilled about 3500 feet. J. M. Guffy & Co.'s well, on the Walz farm, at West Newton, Westmoreland County, was drilled to a depth of 3500 feet. A well well sunk at Northampton, Mass., by Belding Bros. & Co., silk manufacturers, is 3700 feet deep and 8 inches diameter. At a depth of 150 feet from the surface a sedimentary sandstone was struck, which continued the whole depth, and water was never obtained. At St. Louis there is a well 3180 feet deep, which yields an abundance of sulphur water. The well of Isaac Willets, at Sargent's Mills, near Sycamore, in Greene County, was abandoned at 3008 feet.

The deepest bore hole in Europe is said to be at Schladebach, near Kotschau Station, on the railway between Corbetta and Leipzig, and was undertaken by the Prussian government in search for coal. The apparatus used is a diamond drill, down the hollow shaft of which water is forced, rising again to the surface outside the shaft of the drill and inside the tube in which the drill works. By this method cores of about 50 feet in length have been obtained. The average length bored in twenty-four hours is from 20 to 33 feet, but under favorable circumstances as much as 180 feet have been bored in that time. Other deep holes are as follows:

	Feet.
Domnitz, near Wettin.....	3287
Probat-Jesar, Mecklenburg.....	3957
Sperenberg, near Zossen.....	4173
Unseburg, near Stassfurt.....	4242
Lieth-Elmsborn, Holstein.....	4390
Schladebach.....	4515

The bore hole at Schladebach, which in January, 1885, had reached a depth of 4560 feet, was commenced in June, 1880, but left after a year's work; recommenced at the end of 1882, and is still progressing. The cost up to January, 1885, was about \$25,000.

The fiftieth meeting of the American Institute of Mining Engineers will be held at Boston, beginning on Tuesday evening, February 21, 1888, Prof. Robert H. Richards being chairman and Mr. H. M. Howe Secretary of the local committee.

Some very pertinent remarks on the subject of water hammer in steam pipes were recently made by Mr. Peacock, the president of the Manchester Steam Users' Association, Manchester, England. He referred to the violent vibration and noise occasionally observed in the tenders of locomotives

which have been made with the utmost care. This is due to the fact in rolling plates, as in every other kind of work where iron has to be welded, an imperfect weld will sometimes result, in spite of any amount of care and skill. Where the lamination exists at the edge of a plate, it should always be seen during the construction of the boiler, and if of considerable extent the plate should be rejected. But unfortunately this is not always the case. The lamination is more apt to be somewhere away from the edge of the plate, than anywhere else, and then its detection is difficult and in most cases impossible, until it begins to blister under the influence of heat. The treatment of a blister depends entirely upon its character and size. In the majority of cases judicious trimming at the proper time will be the only thing necessary. In other cases the lamination is so deep and extends over so large a surface that the entire sheet has to be removed.

Improvements in Gas Lighting.

The general introduction of electric lighting, we venture to say, has been the cause of numerous improvements in gas-lighting methods, for the competition brought about between the two systems made it necessary to increase the efficiency of gas as an illuminating agent if it was to hold its own against its younger rival. One very noticeable effect was the reduction in the price of gas, which was a simple way to increase its efficiency on a basis of dollars rather than of cubic feet. There is a minimum limit, however, at which gas can be profitably manufactured, and when that is reached increased efficiency must be sought in the direction of better quality or improved forms of burners. One source of economy is heating the gas before it is burned, thus producing a white flame. This principle, which is not novel, is applied in several ways and with varying success. Another general form of improvement which has received considerable attention lately is to more fully utilize the heat of combustion of the gas, with a view to increasing its illuminating power. This idea has been applied in a number of different ways. The essential feature consists in thoroughly burning the gas so as to make a very hot flame through one of low illuminating power. The heat is then converted into light by putting some refractory substance in the flame and heating it to incandescence. Besides producing greater whiteness and brilliancy, such a light has the further advantage of perfect steadiness, the want of which is such a serious fault with ordinary gas burners. Some of our readers are perhaps familiar with the burner in which combs of incombustible material were highly heated in a gas flame. A later invention of this nature in the Welsbach incandescent gaslight in which the incandescent body, which is termed the mantle, consists of a small cone of incombustible matter, in the shape of fine gauze. When heated to incandescence over a small Bunsen burner the mantle emits a brilliant light. As the mantle is incombustible it remains intact, and does not change in any manner until after several hundred hours' use. The mantles are woven from cotton thread and are dipped in chemical solutions, the ingredients of which are the oxides of zirconium, lanthanum, thorium and cerium, which form a coating around the filaments. The mantles are next suspended in the flame of a Bunsen burner, which destroys the cotton and leaves a skeleton of incombustible material. The mantles are also made of two different tones, one of which gives a pure white light and the other a faintly yellow light, the latter being used for domestic and general lighting.

Structural Stiffness.

In a recent issue the London *Engineer* remarked it to be a noteworthy fact that no material, not even the hardest steel, has, if left unstressed, any initial rigidity of stiffness. Put into other words, this means that every material suffers some deformation from every stress to which it is submitted, however small. An admirable example of this is supplied by the mirrors of reflecting telescopes. These are composed of an alloy of tin and copper, extremely hard, rigid and brittle. Lord Rosse used for his great telescope a mixture of 32 of copper to 14.911 of tin, or four atoms of copper to one of tin. The resulting speculum metal is very brilliant, and has been described as "perhaps the most intractable among metallic bodies, so brittle that it breaks, even in large masses, with a slight blow or change of temperature, and so hard and friable that it cannot be wrought with tools of steel." Apparently a mass of this alloy, 3 or 4 inches in thickness and of moderate diameter, ought to be initially stiff if anything is. Yet it is well known that the most extreme precaution must be used in mounting a speculum or it will become distorted by its own weight. "To many," says Nicholl, "it will seem incredible that a disk of this hard and rigid metal, from 4 to 6 inches thick, can bend save except under some force purposely applied; while the fact is that it requires the most refined mechanical contrivance to prevent injurious flexure from its own weight. Even a 9-inch one, if resting on a ring at its circumference on three screws, or, according to the old plan, pressed by springs against three stops, bearing on its edges, loses its defining power." An example more familiar to engineers is that supplied by some of the large horizontal cylinders used in the old low-pressure days in the navy. It was found that, notwithstanding the use of ribs and stiffening webs, such cylinders underwent sufficient distortion to become perceptibly oval when laid on their sides if they were bored out in a vertical position.

The specifications for the great tunnel under the lake at Cleveland, to be commenced next spring, set forth the following requirements: The total length of the tunnel will be 8850 feet, and it will be nearly cylindrical, 7 feet and 2 inches high and 7 feet wide. The wall will be of brick and 12 inches thick. Hydraulic cement mortar will be used as a lining. The tunnel will have a capacity of 110,000,000 gallons. There will be six shafts, including the pumping wells. The shafts proper will number only four—one in the crib, one at the shore of the lake, one for future extension and one in the pump-house yard. The tunnel will be 70 feet below the surface of the lake, and its average depth below the bottom of the lake will be about 30 feet.

About January 15 freight rates from Pittsburgh to San Francisco, Los Angeles, Stockton, San Diego, Portland and all California points will be advanced by all transcontinental lines. The rates on glassware, window-glass, nails and all kinds of manufactured iron will be advanced 9 cents per 100 pounds. The new rates will be: First-class, \$3.60; second, \$2.80; third, \$2.25; fourth, \$1.98; fifth, \$1.62; sixth, \$1.44; seventh, \$1.26; eighth, \$1.17; ninth, \$1.08. These rates are governed by the Pacific Coast classification.

The Altoona shops of the Pennsylvania Railroad are now constructing gondola cars of 60,000 pounds capacity. Fifty cars daily is the output already attained. The greatest change over the old style of cars is in the trucks. They will be lowered several inches and each be supplied with

three sets of wheels. In height the new gondolas will almost equal that of a box car. The managers of the road are confident that by means of this massive rolling stock the car famine will soon be made a thing of the past. The entire locomotive department of the Altoona shops is now employed in constructing engines of the "R" class. Their weight is 136,000 pounds, and they have the largest boiler surface of any engine built in the world. Every day sees a new one turned out of the Altoona shops.

Railroad Stock-Watering.

The report of the Pacific Railway Commission appointed by act of Congress to investigate the accounts and methods of certain railroad corporations which have received aid from the Treasury of the United States makes some startling statements respecting the enormous profits realized by watering stocks. Ex-Governor Pattison, of Pennsylvania, representing a minority of the commission, recites the history of the grant subsidy bonds amounting to \$64,623,512 to the six railroad companies which formed parts of the original scheme of communication between five points on the Missouri River and the Pacific Ocean. It gives the figures showing the payment of interest for 30 years by the Government on these bonds, amounting to \$114,261,247; the grant of 26,000,000 acres of land to the railroad companies, on which they have realized \$39,479,213.71, with lands worth \$26,000,000 yet unsold; the receipt by the companies of aid from other sources, amounting to \$3,070,877, and the further advantage of \$199,790,250, representing the value of the use of the Government's annual advances of \$3,877,410, which it does not require the companies to repay until the maturity of the subsidy bonds in 1895-99. In a table entitled "Cost and Capitalization," the commissioner says: The six roads were built for less than \$96,000,000, yet bonds and stock were issued for \$268,302,462, as follows:

	Cost.	Bonds and stocks.
Union Pacific.....	\$28,824,000	\$190,814,812
Kansas Pacific.....	11,800,000	25,028,250
Central Branch.....	2,731,347	4,200,000
Sioux City and Pacific.....	2,600,000	5,047,720
Central Pacific.....	35,000,000	
Western Pacific.....	4,000,000	124,211,680
Totals.....	\$95,955,347	\$268,302,462

The commissioner finds that large sums were applied by each of the companies to improper purposes; that the four men who controlled the Central Pacific diverted the earnings of that company, through contracts made by themselves with themselves for construction, leases and repairs, and divided over \$142,000,000 in cash and securities; that they built 1171 miles of adjunct lines, and, as directors of the Central Pacific Railroad Company, took leases of their own lines from themselves for the Central Pacific, at the rate of nearly 13 per cent. per annum; that 15 months ago three of these directors contracted with themselves to build an extension of the California and Oregon division of the Central Pacific, a distance of 103 miles, the actual cost of which work was \$3,505,609, while they paid to themselves \$8,000,000 in stock and \$4,500,000 in bonds, personally profiting by that single transaction to the extent of \$4,834,391. As directors of the Central Pacific they also loaned the funds of that company to themselves to build the Southern Pacific, a competing line, across the continent. The present status of the Government debt is also reviewed in detail, and the assertion is made that "at present prices of railroad construction it is evident that from the properties themselves the Government cannot recover within \$108,000,000 of the present value of the indebtedness owing to it by the bond-aided companies."

Contrasting Methods of Building in Great Engineering Works.

According to the *American Architect*, M. Max de Nansouty, editor of *Le Génie Civil*, writes for that journal a rather striking comparative notice of the methods in use in the construction of what may be called the two rival aspirants for the place of the greatest works of engineering in the world—the Forth Bridge and the Eiffel Tower at Paris. The former of these gigantic structures is now well advanced. The foundations of the piers are in place, and the enormous cantilever arches, 1700 feet each in clear span, already tower far above the water of the estuary. As is well known, the cantilever construction requires no staging or “false works,” and the main piers being now practically complete, nothing more is necessary but to build out from these until the corresponding portions of the two cantilevers meet over the middle of the abyss. In doing this M. de Nansouty observes that numerous drawings are kept on the ground; the pieces of iron are brought from the shops in a very unfinished condition, and are, after arriving at the work, trimmed, drilled, reamed and fitted with considerable trouble, to make them correspond with the drawings and occupy properly their destined places, while gussets and patches are cut out and drilled on the spot. All this is, of course, perfectly legitimate and perhaps necessary, but M. de Nansouty is much impressed with the contrast between the noise and bustle involved in this way of doing things and the quietness with which the Eiffel tower is constructed. In the French work there is absolutely no fitting, trimming or drilling. Even the use of a drift-pin or a reamer to bring into accord two rivet holes not punched exactly in the right place is forbidden, and the workmen have strict orders to return to the shop every bar, rod or angle iron which does not exactly fit its intended place when received.

Of course, such accuracy as this requires great care in laying out the drawings for the work, and, in fact, in the shop at Levallois-Perret, the countless drawings have all the dimensions shown upon them figured by calculation to four places of decimals, the greatest error permitted in the figures being $\frac{1}{10}$ mm., or about $\frac{1}{250}$ inch. Of course pieces made in this way come together like the parts of a watch, and every portion is numbered and labelled, so that there can be no mistake as to its proper position, and the handling of huge detail drawings on the ground is unnecessary. The work of setting up being thus reduced simply to riveting, it is only necessary to keep a small gang of men employed, and the huge tower grows rapidly, but silently. In regard to the rumors which have been spread from time to time, to the effect that the men engaged on the tower had shown so much terror at being obliged to work so high up in the air that the project was about to be abandoned, M. de Nansouty remarks that these apprehensions have arisen only in the imaginations of persons ignorant of the subject. To the men themselves the idea that it made any difference whether they worked one foot or a 1000 feet above the ground would appear exquisitely ridiculous, long practice having given such persons abroad, as it does to bridge-building gangs here, nerves proof against dizziness under any circumstances.

Rope Transmission in England.

According to the *London Engineer*, a fly-rope apparently was first used in England in 1863, by Mr. Ramsbottom, for driving cranes at Crewe. These ropes were $\frac{3}{4}$ inch diameter when new, of cotton, and weighing $1\frac{1}{2}$ ounces per foot. They lasted

about eight months, and ran at 5000 feet per minute. The total lengths of the rope were 800 feet, 320 feet and 560 feet. The grooves in the pulley were V-shaped, at an angle of 30° . The cord was supported every 12 feet or 14 feet by flat pieces of chilled cast-iron. The actual power strain on the rope was about 17 pounds, and the ropes were kept tight by a pull of 109 pounds put on by a jockey pulley. Rope-gearing is now superseding belting and gearing in cotton mills. It has long been used in South Wales for driving helve hammers in tin-plate mills. The ropes are usually about $5\frac{1}{2}$ inches to 6 inches in circumference, of hemp. The diameter of the pulleys should be at least 30 times that of the rope, and the shafts should not be less than 20 feet apart. A $6\frac{1}{2}$ -inch rope is about equivalent to a leather belt 4 inches wide, running at the same speed—3000 feet per minute. Such a rope will transmit 25 horse-power. The coefficient of resistance to slipping of a rope in a groove is about four times that of an equivalent belt.

Grinding Mills.

The Foos Mfg. Company, of Springfield, Ohio, are putting on the market a number of different styles of what they call their “Scientific” mills for grinding cobs or grain of any kind, and for which a number of advantages over existing types are claimed. Perhaps the principal feature of the mills is found in the grinding plates which are made in sections (six in all, three on the running and three on the still plate). These sections, three at a time, are put in a machine built especially for this purpose, and ground on the back to a perfectly true and accurate bearing, and then are bolted to castings or heads (which are first carefully balanced), each section having three bolts which are held in place by nuts, each nut being securely held in place by a nut lock, so that it cannot possibly work loose or get into the mill. The nut locks can easily be taken off with a chisel, when the bolts can be taken off and the sections removed and replaced when worn. Each set of plates is ground alike so that extra plates can be put in any mill of proper size in a short time and with little trouble and by any one of ordinary skill and intelligence.

The plan adopted in the plates is that of gradual reduction.

First, there are large ribs on the plates close around the shaft which lack less than 1 inch of coming together; these do the first work and break the grain in two or three pieces. Then come numerous small A-like figures, which stand nearly one-fourth of an inch above the surface of the plates. These have sharp edges and cut the grain as it passes from one to the other. Then comes a ring of fine reversed inclines, extending entirely around the outer edge of both running and still plate. These take the grain, now reduced to small, gritty particles, and, by rubbing, reduce a portion of the product to a soft, floury meal. The A-shaped projections must wear down to the surfaces of the plates before they become useless. The figures are alike on both sides, and when one side is used in grinding the other side remains untouched. When one side, therefore, becomes worn, the mill can be run in the opposite direction by crossing the belt and changing the spout, bringing into action the fresh surfaces. As these are used the action of the grain, it is claimed, sharpens the dull side, the plates thus being self-sharpening.

The crusher on the shaft has lugs which have angles, the crusher the nature of a conveyor, so that the grain and broken cobs are carried to the grinding plates. This is held securely in position on the shaft, without the use of any bolt, set-

screw, key-seat or pin. In order to prevent accidents from bolts, set-screws, &c., getting into the mills, a pin breaker is used. This consists of a wooden pin holding one side of a yoke which holds the temper screw regulating the feed. Any hard substance coming between the plates will break this pin and allow the plates to run apart. It works automatically and requires no watching or attention whatever. The plates are so arranged as to permit an opening of 1 inch.

The mills throughout are presented as of a high class of workmanship, and have thus far given most satisfactory results.

Deep Wells.

According to recently published figures the deepest well drilled in the United States is that of George Westinghouse, at Homewood, near the city of Pittsburgh, which, on December 1, 1886, had reached a depth of 4618 feet, when the tools were lost and drilling ceased. The Buchanan farm well of the Niagara Oil Company, drilled by Frederick Crocker, in Hopewell Township, Washington County, is 4303 feet deep. The Rush well, of the Niagara Oil Company, in Washington County, was abandoned at 3300 feet. The deep well of Jonathan Watson, near Titusville, was drilled about 3500 feet. J. M. Guffy & Co.'s well, on the Walz farm, at West Newton, Westmoreland County, was drilled to a depth of 3500 feet. A well sunk at Northampton, Mass., by Belding Bros. & Co., silk manufacturers, is 3700 feet deep and 8 inches diameter. At a depth of 150 feet from the surface a sedimentary sandstone was struck, which continued the whole depth, and water was never obtained. At St. Louis there is a well 3180 feet deep, which yields an abundance of sulphur water. The well of Isaac Willetts, at Sargent's Mills, near Sycamore, in Greene County, was abandoned at 3008 feet.

The deepest bore hole in Europe is said to be at Schladebach, near Kotschau Station, on the railway between Corbetta and Leipzig, and was undertaken by the Prussian government in search for coal. The apparatus used is a diamond drill, down the hollow shaft of which water is forced, rising again to the surface outside the shaft of the drill and inside the tube in which the drill works. By this method cores of about 50 feet in length have been obtained. The average length bored in twenty-four hours is from 20 to 33 feet, but under favorable circumstances as much as 180 feet have been bored in that time. Other deep holes are as follows:

	Feet.
Domnitz, near Wettin.....	3287
Probat-Jesar, Mecklenburg.....	3957
Sperenberg, near Zossen.....	4173
Unseburg, near Stassfurt.....	4242
Lieth-Elmsborn, Holstein.....	4380
Schladebach.....	4515

The bore hole at Schladebach, which in January, 1885, had reached a depth of 4560 feet, was commenced in June, 1880, but left after a year's work; recommenced at the end of 1882, and is still progressing. The cost up to January, 1885, was about \$25,000.

The fiftieth meeting of the American Institute of Mining Engineers will be held at Boston, beginning on Tuesday evening, February 21, 1888, Prof. Robert H. Richards being chairman and Mr. H. M. Howe Secretary of the local committee.

Some very pertinent remarks on the subject of water hammer in steam pipes were recently made by Mr. Peacock, the president of the Manchester Steam Users' Association, Manchester, England. He referred to the violent vibration and noise occasionally observed in the tenders of locomotives

when standing at railway stations, owing to the driver turning his surplus steam into the feed-tank. This was caused by the rapid condensation of the steam, and although not precisely similar to the action which occurred in steam-pipes, it served to give an idea of the forces which were in operation. The bursting of steam-pipes from water hammer action was, he said, by no means infrequent, and could only be avoided by preventing all accumulation of water therein. Should there be any dip in the pipe that rendered the accumulation of water possible, a drain tap should be fixed thereto and kept open constantly. The water should not be al-

Apparatus for Toughening Steel Axles.

In connection with our report last month of the recent Philadelphia meeting of the American Society of Mechanical Engineers, we published a paper on "Steel Car Axles,"* presented at that meeting by Mr. John Coffin, of the Cambria Iron Company, Johnstown, Pa. Mr. Coffin, it will perhaps be remembered, described, among other things, the process of treating axles adopted at the works of the Cambria Iron Company, and by means of which a very high elastic limit was reached in the steel without loss of elongation. The process is substantially as follows: After forging

We take pleasure in presenting in this issue engravings of the cooling apparatus employed, Mr. Coffin having kindly favored us with the necessary blue-prints and particulars. The heating furnace will hold about 12 axles, and has a charging door on one side and a drawing door on the other. Every time an axle is drawn all those in the furnace are rolled forward and a cold one charged at the rear. In front of the furnace is a long bosh, A (Fig. 1), filled with water, only one end being shown, as the other is practically similar in arrangement. This bosh is provided with a submerged jet-pipe, as shown in the cross-section (Fig. 2), and

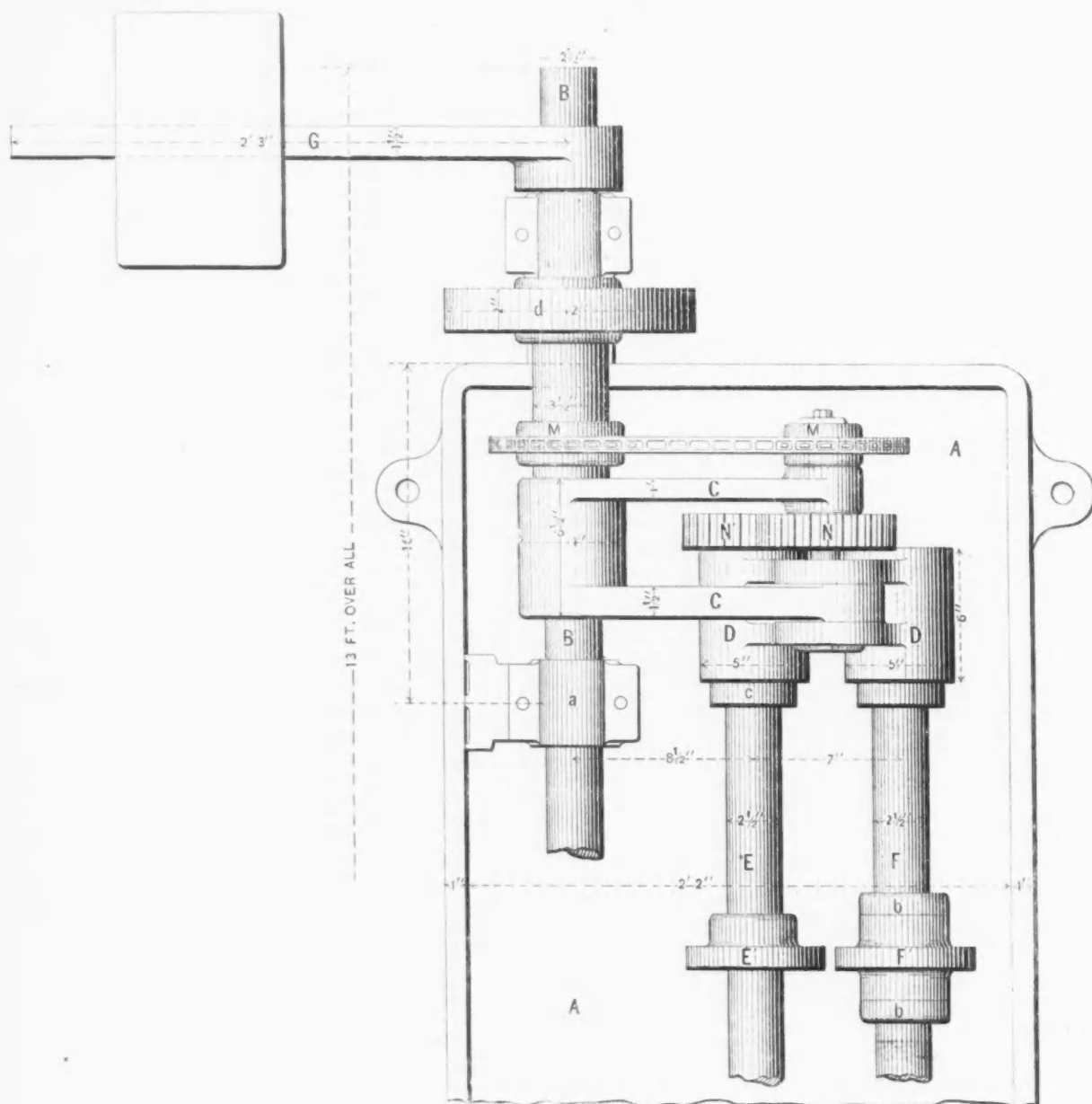


Fig. 1.—Plan.

AXLE TEMPERING PLANT AT THE WORKS OF THE CAMBRIA IRON COMPANY, JOHNSTOWN, PA.

lowed to accumulate and then be suddenly discharged, but the tap should be kept slightly open so as to prevent any accumulation whatever.

The Industrial Education Commission of Pennsylvania organized in Harrisburg last week, electing Dr. Atherton president, and a number of questions pertinent to the subject were referred to the different members for investigation. The commission will also inquire how far the educational element should be incorporated into such training, as distinguished from its strictly trade, apprentice or technical element.

the axles are cooled completely, so that the carbon will be in the non-hardening state; they are then heated until the temperature is reached at which the carbon changes to its hardening state, the time of so heating them being a little over an hour; the result of this change of carbon being to break up the crystallization completely and put the steel in an amorphous state. They are then cooled as rapidly as possible to a temperature somewhat below that at which the carbon begins to change to non-hardening carbon, and the subsequent cooling is done in the open air.

over this from arms C C is suspended a cradle furnished with friction-wheels or rollers, E' F'. These are mounted on the shafts E and F, the former being revolved by power, through the intervention of the gears N and N', a link belt and sprocket-wheels, M and M', and a belt pulley d on the shaft B. The latter is supported on brackets a a as shown, and is furnished at its end with an adjustable counter-weight sliding on the wrought-iron lever G. At the lower end of the shaft B, not shown in the plan, is a lever by means of which the cradle may be readily raised from or lowered into the bosh. The sketch in Fig. 4 illustrates the arrangement.

* The Iron Age, December 1, 1887.

In carrying out the process the axle is rolled out of the furnace on to the wheels E' and F', the former being secured to its shaft by a set screw, while the latter is free to revolve, being retained in its proper position by the wrought-iron collars b b.

volving axle. In a few seconds the cradle is raised, carrying with it the revolving axle above the surface of the water. The axle is then picked up by a little jib crane and deposited on the cooling bed. There is still enough heat re-

are detected, when pressure being brought to bear on the high part by a simple hand lever, the axle is easily straightened. The automatic arrangement illustrated in Fig. 4 presents a needless waste of water, the supply-pipe being opened only when an

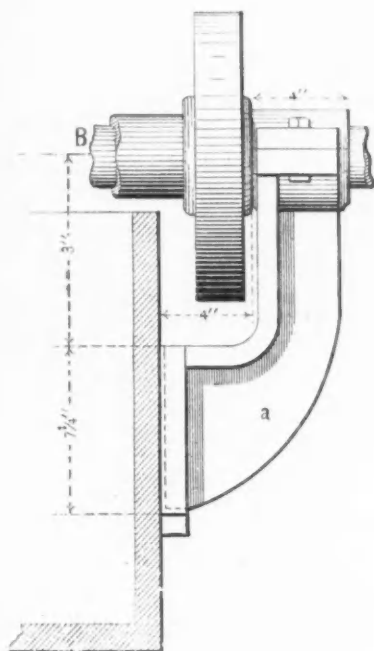


Fig. 3.—Side View Showing End Bracket.

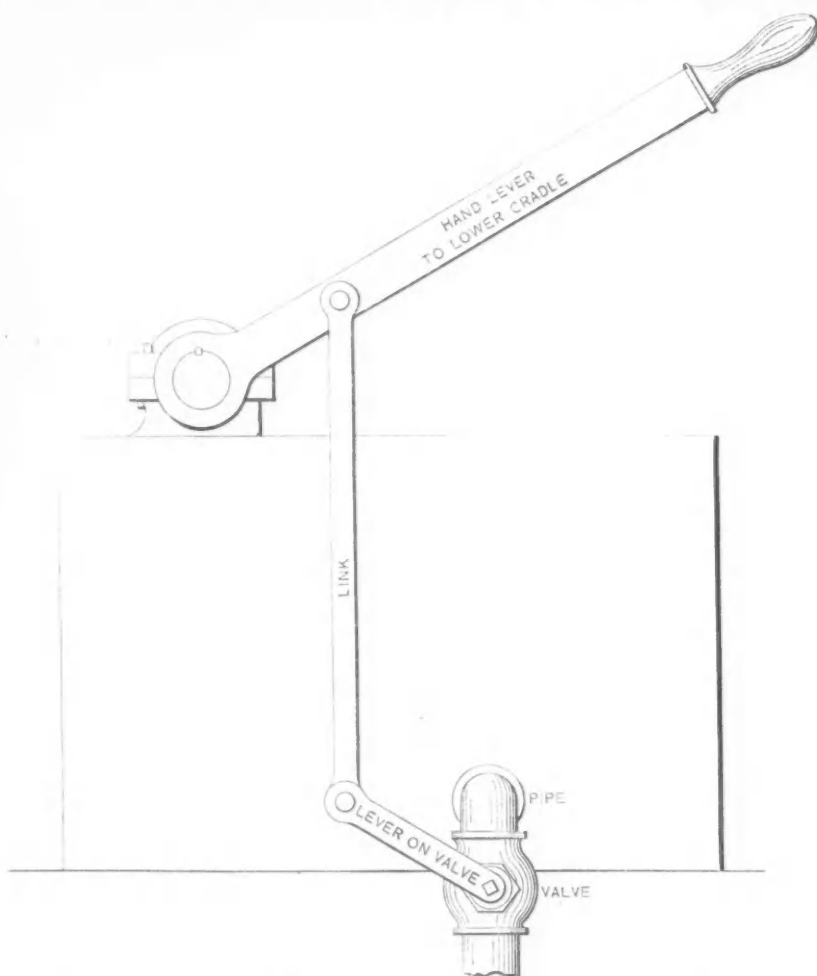


Fig. 4.—Diagram of Raising and Lowering Lever and Spray Pipe Valve Gear.

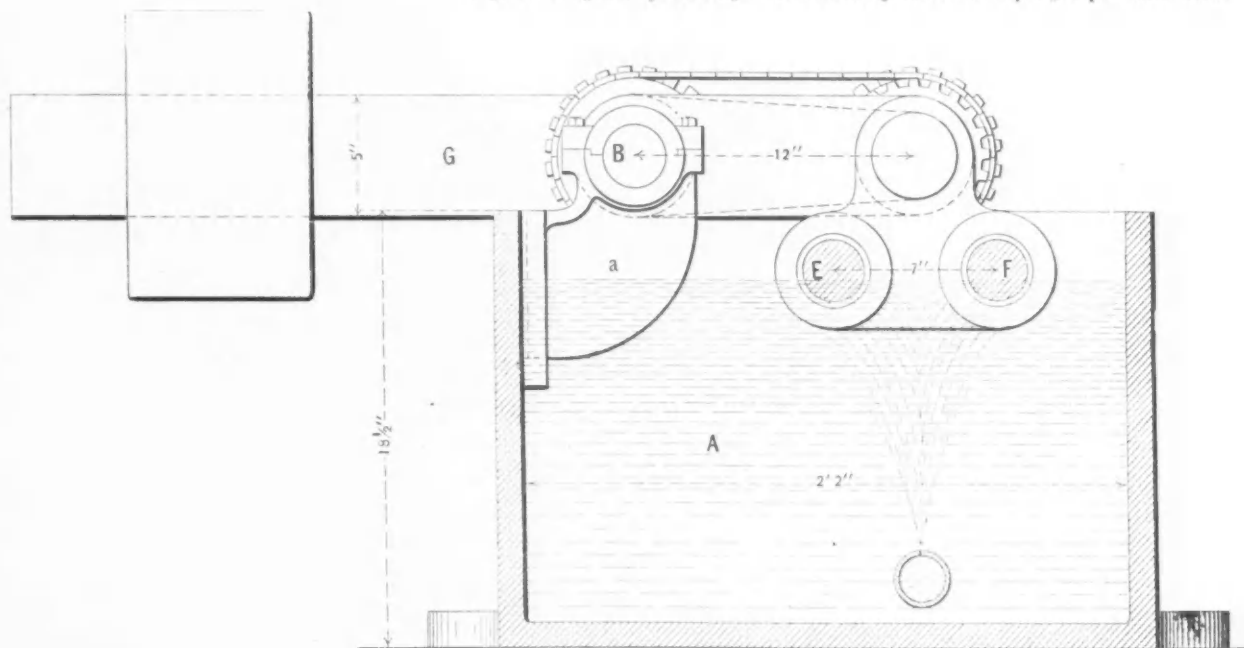


Fig. 2.—Cross Section and End View.

AXLE TEMPERING PLANT AT THE WORKS OF THE CAMBRIA IRON COMPANY, JOHNSTOWN, PA.

The friction of the wheels sets the axle in rapid rotation. The cradle is then lowered below the surface of the water, while at the same time a valve, as will be understood from Fig. 4, is automatically opened in the water supply-pipe to allow the powerful submerged jets to play on the re-

maining in the interior to bring its whole mass to a dark red heat in the dusk. The bed is constructed of I-beams, bolted rigidly together to conform nearly to the shape of the axle, but with the central part of the bed a little low. The axle is rolled on this bed and the bends, if any,

axle is immersed. Mr. Coffin informs us that at the works of the Cambria Company they have a large toughening machine for locomotive axles similar to the one specially considered, except that the cradle is lowered and raised by hydraulic power.

Recent Legal Decisions.

BANKING.

L. presented the check of W. drawn to W.'s order, which W. had had certified, and had delivered to L. in payment of goods, to the bank for payment, which was refused because W.'s indorsement was not upon it. L. then sued the bank and recovered a judgment, and the bank took the case—*Lynch vs. First National Bank of Jersey City*—to the New York Court of Appeals, where the judgment was reversed. The Chief Judge, Rogers, in the opinion, said: "It is clear here on the evidence that there was no contract made between W. and L. whereby any transfer of the deposit in the bank was intended to be made beyond that which would follow upon the mere delivery of the check. The action brought can only be supported by proof that all of the conditions upon which the authority of the bank to pay the check was made to depend by the drawer have been performed. The mere drawing and delivery of a check to a third person by a depositor does not constitute an assignment to the payee named therein of the fund held by the bank. A check is analogous to a bill of exchange, and a bank cannot be made liable therein, except by its acceptance indorsed upon it in writing. An acceptance of the check, however, was made by the bank, we think, when, through its agent, it indorsed thereon a certificate of genuineness and directed its payment by the American Exchange National Bank. This operated as a promise to pay it upon presentation at the American National Bank, on its bearing W.'s indorsement. Such a contract the bank had a right to make, limiting its liability to an order properly indorsed by the depositor, and the depositor had the right to impose upon the bank the conditions that his money was to be paid out by it only upon a check indorsed by himself, and by his payee if he had delivered it indorsed to another. It would certainly add much to the hazard of the transmission of fraud by check or draft through the mail or by express if the banks or agencies upon which they were drawn should be compelled to pay them to the holders by an action at law, when they do not have upon their face the evidence of the performance of the condition upon which the drawee had authorized their payment. If the bank certifies a check for the holder of it, who has purchased it for value from the payee, though the payee has not indorsed it, the bank must pay it. But that is not the case here."

PARTNERSHIP.

An action was brought to recover upon a partnership note, and the defense was set up that the note had been given after the firm had been dissolved; but it was shown that the firm to whom the note had been delivered had not been informed of the dissolution. The defense prevailed, though it was shown that the persons making the note had paid a part of it, and the plaintiff carried the case—*Clement vs. Clement*—to the Supreme Court of Wisconsin, where the judgment was reversed. Judge Orton, in the opinion, said: "There are incidental rights and liabilities of a partnership which makes the members of the firm something more than mere joint contractors, and it is only after notice of the dissolution of the firm to the creditor that the partners are then placed upon the same footing of other joint contractors. Until the payee knows of the dissolution, any note or payment thereon, made by one partner within the scope of the partnership business, binds the other partner also. A partnership debt remains the same after dissolution, and the partners are all responsible for the whole debt each, any arrangement to the contrary between themselves notwithstanding, and they are still

agents for each other in making payments, or doing anything immaterial to the contract. Dissolution does not revoke the authority of one partner as the agent for the others to arrange, settle, liquidate, and pay the debts before created, so any payment of a firm note made by any member of the firm so binds it that the statute of limitation will not be a defense. The making of the note clearly bound the partnership, the payee not having been advised of the dissolution of the firm. The purpose of the dissolution was to avoid any further liability of a partnership character, and it should be evident to each member of the firm that to protect himself he must see that due publication or notice of the separation is given."

CONTRACT OF EMPLOYMENT.

C. was employed by an iron company as assistant manager at wages fixed at \$1000 for the term, payable in monthly installments, and he was given a house rent free, with a cow and coal at cost. The contract was made in April, 1882, and after the expiration of the term he continued in the employment without any further agreement until September 1, 1886, when he was discharged because the company wished to retrench expenses. C. brought an action to recover his compensation from September 1, 1886, to April 1, 1887, and recovered a judgment from which the company took an appeal—the *McCullough Iron Company vs. Carpenter*—to the Maryland Court of Appeals, where the plaintiff again succeeded. Judge Irving, in the opinion, said: "The defendant contends that the contract of hiring after the expiration of the year for which plaintiff was hired became indefinite, that though there was an agreement to pay by the month, no time of hiring being specified, nothing but an indefinite hiring is shown. It is true that a hiring at so much a week, month or year, no time being specified as to its duration, is an indefinite engagement, but it is competent to show what the mutual understanding was to fix the term of the employment. Here, however, the hiring must be determined by the surrounding circumstances. C. had been employed at the beginning for a year, and for more than three years after the expiration of the year he continued at his work, and was paid the regular monthly wages, and had the house and cow free and his coal at cost. It is distinctly held in England that if the contract is made for a year and there is no disagreement, and the service continues, the same contract will by presumption prevail for the next year without any new agreement, and the same rule of law is declared in this country. The courts of New Hampshire, Pennsylvania, California and New York have so decided, and a leading writer on master and servant states it to be the law here. This is a matter of presumption, however, only, and it may be rebutted."

SALE—DELIVERY—INTENTION.

C. bought from a bank certain land, and it took in part payment certain personal property under the following memorandum: "For and in consideration of the conveyance of 40 acres of land to me by W. B. Bonfield, president, and W. A. McGrew, cashier, First National Bank, I hereby sell to said parties stock and grain on my place as follows: Hogs, now on the place and to be purchased; ear-corn, 700 to 800 bushels, more or less; buckwheat, 200 bushels, more or less; oats, 250 bushels, more or less, the sale of said grain to be credited on my debt to them, and said hogs and grain held as their property until sold and so applied." Before this property was delivered to the bank creditors of C. seized it in execution and the bank sued to recover it, but the court decided that as there had been no delivery of the property C. had possession, and the execution bound it. The

bank carried the case—*First National Bank of Ottumwa vs. Reno*—to the Supreme Court of Iowa, where the judgment was reversed. Judge Reed, in the opinion, said: "The contract had reference to specific property, but there was no delivery, and the price to be paid for it was dependent on two things to be ascertained in the future—namely, the quantity and the prices at which it would be sold. The question of the case is whether this transaction is a completed sale or an executory contract, and it is a question of interest. If there had been an actual delivery, and nothing remains to be done to ascertain the price and quality of the article, the strong presumption is that the intention was to pass the title. On the other hand, if delivery has not been made, and something yet remains to be done in order to ascertain its quality and price, such as inspecting or weighing it, the presumption is equally strong that it was the intention that the ownership should remain in the vender. But in neither case is the presumption conclusive. It would be competent for the parties to contract in the one case that the title should remain in the vender, notwithstanding the delivery; or, in the other, that it should pass to the vender in advance of delivery. We think, in opposition to the courts below, that the contract here clearly indicates an intention by the parties to make a present sale and transfer of the property; the language of the memorandum is not fairly susceptible of any other construction."

FIRE INSURANCE—PROPORTIONATE LIABILITY—OTHER INSURANCE WHICH IS NOT VALID.

C. was insured upon his stock of goods by a policy for \$750, and in it was provided that the company should be liable only for actual damage to the cash value at the time of the fire, and that the company should pay its proportion with other companies should there be any other insurance, without reference to the solvency or liability of the other insurance. At the time this policy was taken out C. had a policy in another company which provided that if any other insurance was taken out without its consent the policy was void. The last policy was taken out without any compliance with this provision, and the company repudiated its contract. The second insurer refused to pay any more than its proportionate part, and the insured then sued for the full amount of the policy, but he got only what the company offered to pay. C. carried the case—*Cassidy vs. New Orleans Insurance Association*—to the Supreme Court of Mississippi, where the judgment was affirmed. The chief justice, Cooper, in the opinion, said: "The plaintiff insists that the invalidity of the first policy took it out of the provision of the policy, but we cannot assent to this construction of the policy in question. In the absence of a stipulation of this character the insurer might recover from any one of a number of insurers the whole loss sustained by him, leaving the party from whom full recovery had been had recourse on the other insurers for contribution of the loss paid. Under such circumstances it would devolve upon the company seeking contribution to establish the validity of the second contract of insurance, and it would bear its proportion of loss arising from the insolvency of one or more of its co-insurers. To obviate this inconvenience and hazard, the clause under consideration is inserted in the policy. We cannot distinguish between a policy of insurance on which there is 'no liability of the insurer' and an 'invalid' policy; to do so would be to involve real and important rights in mere scholasticism, and parties to the contracts would, we doubt not, be astounded to hear what right or duty a court so proceeding would evolve from the ordinary contracts of the day."

New Companies.

Articles of incorporation of the following companies have been filed:

The Dame & Townsend Company, to manufacture iron, brass and other metal pipes, tubes, valves, fittings, hardware, railroad supplies, &c. Capital stock, \$100,000; to operate in New York City and New Jersey. Trustees, August A. Dame and William N. Cromwell, of Brooklyn, and Morse Burtis, of Englewood, N. J.

The North American Cigar Machinery Company; to operate in New York City and elsewhere. Capital stock, \$500,000. Trustees, David J. Boehm, Elias Osiel, John Frankenheimer, Siegfried Prince, Mich. Stachelberg, Sigmund Jacoby, Ed. Lauterbach, Isaac Hamburger and B. Davis Washburn.

The Chase Combination Car Spring Mfg. Company, to make the Chase combination car spring and Bell trust bar elliptic spring, at Bridgeport. Capital stock, \$500,000. Trustees, Thomas B. Chase, William R. Webster and William McGibbon, of Brooklyn; Otis Randall, of New York, and Joel Farist, of Bridgeport.

The Hemingway Mfg. Company, of Syracuse, to manufacture machinery, metal cans and other packages for preserves, &c. Capital stock, \$30,000. Trustees, Harvey C. Hemingway, Dwight E. Hemingway and Edward W. Parmlee.

The Vulcan Steel and Wire Company, to manufacture and sell spring steel and wire, in Brooklyn. Capital stock, \$100,000. Trustees, Oscar Lublin, Bernard J. Malone and John Rooney.

The Isbell Machinery Company, to manufacture and sell engines, motors, pumps, meters, hydraulic rams, railway switches, machinery, machinists' supplies, tools, &c. Capital stock, \$100,000. To operate in Eastchester and New York City. Trustees, Robert H. Isbell, George F. Betts, S. S. Clark, Matthew E. Logan and Walter S. Logan.

Another meeting of the Connellsville coke operators was held in the office of the old syndicate in the Lewis Block, Pittsburgh, on Friday, the 30th ult., for the purpose of completing the formation of the new coke syndicate, but, from the fact that so many difficulties have arisen, the object has not yet been accomplished, but, unless all signs fail, the details will be completed during the present week. At the above meeting it was decided to make a reduction in the price of coke, taking effect on the 1st inst. The new prices are as follows; Furnaces, \$1.75 per ton; dealers, \$1.85 per ton and to foundries, \$2 per ton. For nearly a year the prices have been—to furnaces, \$2; dealers, \$2.15, and foundries, \$2.30. It is intimated that this reduction was not made merely for the accommodation of consumers, but was done to prevent as far as possible the erection of new ovens. In view of the fact that the H. C. Frick Coke Company are not prospective members of the new syndicate, it is not known how they will view this action in reducing the price of coke, but it is thought that they will agree to the reduction. As is well known, their employees are working under a sliding scale, and when coke comes down their wages are reduced accordingly.

It is estimated that the air in a room becomes distinctly bad for health when its carbonic acid exceeds 1 part in 1000. An apparatus has been recently patented by Professor Wolpert, of Nürnberg, which affords a measure of the carbonic acid present. From a vessel containing a red liquid (soda solution with phenolphthalein) there comes every 100 seconds, through a siphon-arrangement, a red drop on a pre-

pared white thread about $1\frac{1}{2}$ feet long, and trickles down this. Behind the thread is a scale beginning with "pure air" (up to 0.7 per 1000) at the bottom, and ending above with "extremely bad" (0.4 to 0.7 per 1000 and more). In pure air the drop continues red down to the bottom, but it loses its color by the action of carbonic acid and the sooner the more there is of that gas present.

Natural Gas Companies Consolidated.

For some weeks past the stockholders of Philadelphia Natural Gas Company and the Chartiers Valley Natural Gas Company, the two largest companies in Pittsburgh, have been endeavoring to consolidate their interests, and while every endeavor has been made to keep the matter from the public, it has leaked out that the deal has been successfully accomplished. As near as can be learned it appears that the Philadelphia company will take entire charge of the affairs of the Chartiers company and both companies will be consolidated into one, to be known as the Philadelphia Natural Gas Company. The officers of the Philadelphia company will take charge of the entire plant of both concerns. The profits of the consolidated companies will be divided at the rate of 70 per cent. to the Philadelphia and 30 per cent. to the Chartiers. The receipts of the Philadelphia company per annum, at present prices of gas, are estimated at about \$1,800,000, and of the Chartiers company \$600,000, making a total of \$2,400,000 for both companies. The estimated expense of both companies for one year are \$400,000, which leaves profits to be divided between the companies of \$2,000,000. Of this sum 70 per cent., or \$1,400,000, will be the Philadelphia company's share, and 30 per cent., or \$600,000, will be the Chartiers company's share. After paying its usual 12 per cent. yearly dividend, on its capital stock of \$7,500,000, which will be \$900,000, there will be a surplus in the Philadelphia company's treasury of \$500,000. The Chartiers company, which pays a yearly dividend of 10 per cent. on a capital stock of \$4,000,000, amounting to \$400,000, will have a surplus of \$200,000. While the above is a very correct estimate of the profits and expenses of these companies, it will hardly be considered a basis for future business, as the price of gas, now that the consolidation has been effected, will be increased considerably, which, of course, will add to the revenue of the new company. While the consolidation of these companies may be very gratifying to the stockholders, and a cause of rejoicing, it will hardly be viewed in the same light by the consumers, who will be made to pay increased rates for gas. The Philadelphia company, under date of the 2d inst., issued the following circular to its patrons, which will explain itself:

PITTSBURGH, Pa., January 2, 1888.

To Our Patrons:

A recent inspection of the houses supplied with gas from this company's lines demonstrates that in a large number of residences gas is being used in fireplaces and for illuminating not provided for in the contract, and for which service we are not being compensated. We, therefore, desire to give notice to persons who have thus violated their contract that unless a prompt return is made to our district agent, or to the main office, of any fireplaces in use or fitted up for use, or any other gas service not already provided for in their contracts, such extra service will be charged, as it is returned by our inspectors, at double rates, dating such charge from commencement of the winter months; or, where there is evidence of an intention to deliberately defraud the company, the supply of gas will be discon-

tinued and the contract canceled. Persons desiring the use of additional service can be readily accommodated by making application to our district agent, who will name a price and issue proper evidence, to be attached to the original contract.

Yours respectfully,

PHILADELPHIA COMPANY.

T. R. MCGINLEY,

Secretary and General Agent.

An Agreement in the Boston Bar Iron Trade.

The dealers in Boston in American and Swedish bar iron have issued the following circular, for a copy of which we are indebted to Messrs. Bacon & Co.:

In order to establish a fair and uniform system, giving to all buyers the full benefit of cash payment, we shall, on and after January 1, 1888, adjust our prices to a strictly 30 days' basis, charging interest at the rate of 6 per cent. per annum for all time taken by purchaser after 30 days from date of bill, and allowing interest at the same rate for payment before due date. By this system equal and exact justice is done both to buyer and seller, the buyer receiving the full advantage of cash remittance, or paying for whatever extra time is taken. Also, on and after January 1, 1888, we shall, on all deliveries from store, wharf or storehouse, charge and collect a minimum sum of 75 cents per ton of 2240 pounds for cartage.

FULLER, DANA & FITZ,

BACON & Co.,

CHAS. E. BRIGHAM,

BROWN, McCURE & Co.,

E. P. SANDERSON & Co.,

WM. M. HORNE & Co.,

JAMES C. WARR,

CHAS. G. LUNDELL,

GUSTAF LUNDBERG,

McBARRON & Co.

The condition of terms applies to all business, but the matter of cartage only to sales to New England customers. The movement is of more than local importance, from the fact that the merchant iron trade of almost the entire country replenishes stocks of Swedish and Norway iron from dealers' stocks in Boston.

The Swinerton Locomotive.—A locomotive possessing several unusual features has been recently built by the Hinkley Locomotive Company, of Boston, for the Swinerton Locomotive Driving Wheel Company. The engine is designed to run fast passenger trains, and has a single pair of drivers, 67 inches diameter on tread, and a pair of 42-inch trailing wheels with radial motion. The front end of the engine is carried on a four-wheel truck, as usual. The engine has piston-valves, but the most novel feature is the form of the tread of the driving wheels. The circumference of the tire, instead of being a true circle, is polygonal, and formed of 105 flats, each about 2 inches long. The object is to prevent slipping. The engine has not yet been tried, but it is claimed that polygonal tires have been running on a four-coupled engine on the Boston and Lowell during the last year with satisfactory results. A flat wheel is generally regarded as damaging to the rails, while the motion of an engine or car with flat wheels is exceedingly unpleasant. Whether any extra adhesion will be gained seems doubtful, but even this means of preventing slipping would certainly, according to all preconceived notions, be more objectionable than the use of sand.

The importation duties at Lima, Peru, have been raised 5 per cent. ad valorem, the product to be applied to the amortization of the paper currency.

THE WEEK.

The rush of California overland travel under the stimulus of quick time appears from the statement that since the beginning of September 35,000 passengers have been carried by the different railroads, and it is calculated that 50,000 persons from the East will sojourn on the Pacific Coast during the winter season. It may almost be said that California and Florida are equidistant under the new schedule time.

Mayor Hewitt, at the Board of Trade banquet in this city, expressed himself freely in denunciation of those combinations of laborers who obstruct the transportation of merchandise as a means of enforcing their demands. "Transporting agents," he said, "have duties to perform; those duties are well defined; they are embodied in the common statute law; they are your defense against destruction of your business. The duty of the common carrier is a right of the citizen; it is the property of the public, and any attack, therefore, upon the common carrier is an attack upon property. It is an attack upon the very foundations of social order; it is a crime worse than burglary or murder; it robs the whole community; it takes away from the fireside the fuel which is necessary for cooking the dinner of the workingman; it takes away from the manufacturer the power which gives bread to his workmen, and it destroys the very foundation of social order. And yet here to-day the element exists in this land which has dared to assume this power. Who are the men who have done this? You don't know their names; they hold no commission from the people, but sitting in secret conclave have agreed to do this which means ruin to every city in the land. This measure is greater than tariff, greater than surplus; it must be settled."

The old "head money" tax on emigrants, now abolished, exerted a wholesome influence, so far as it tended to exclude from United States ports that worthless class who are unable to gain a subsistence in Europe and migrate from workhouses in the United Kingdom and the Continent to tax the industries of the New World.

John T. Decker, treasurer and business manager of the E. G. Blakslee Mfg. Company, died on December 28, at Brooklyn, N. Y., of pneumonia, aged 44 years. Mr. Decker was born at Croton Landing, on the Hudson. He was widely known in the iron trade in this city and vicinity, having been engaged in that business for the past 20 years.

The Executive Committee of the Canal Improvement Union ask the New York Legislature to appropriate \$1,000,000, pursuant to a resolution of the convention, adopted in July.

The United States consul at Tampico estimates the value of the Mexican sugar crop at \$8,875,000. Allowing 3 cents per pound, the product would be 295,833,333 pounds, or a little more than the product of the Hawaiian group. Of the total the export equals 6,959,100 pounds. At no distant day sugar production on the west coast of Mexico will be an important industry.

An unfortunate case for Canadian banks has arisen at Detroit, growing out of the decision of the United States Collector at that point to enforce the law requiring that a tax of 10 per cent. shall be paid by every bank or banking association on the amount of "notes of any person or any State bank or State banking association used for circulation and paid out by them." This act aimed at the extermination of the scrip issued by mining companies, lumber firms, and other corporations or individuals, including State banks, as well as to prevent

the circulation of foreign currency in competition with that established by the United States Government. The Collector rules that the notes of a Canadian bank are included in the provisions of the law. Investigation in Detroit shows that a very large amount of Canadian money is handled by the Detroit banks.

The State of Kansas never before enjoyed such an increase in population and growth of important industries as during the year 1887. The stimulus was due principally to the building of railroads, nearly every part being now easily accessible and provided with facilities for transportation. Silk culture, for which the Legislature made an appropriation, proves to be entirely feasible, and both sorghum and sugar cane can be grown there profitably. Not less important is the discovery of beds of rock salt at Hutchinson, which already expects to become the great salt center of the West. A test well passed into the bed 130 feet. Hutchinson, which is intersected by the Missouri Pacific and Rock Island railroads, claims to have a population of 9900, taking rank as the ninth city in the State. Topeka ranks first with a population of nearly 39,000. The next in order are Wichita, 32,300; Leavenworth, 31,400; Kansas City, 27,000; Atchison, 23,000; Fort Scott, 15,000; Lawrence, 12,000; Emporia, 10,000.

Shipbuilders in Detroit are crowded with work at good wages, and contracts are heavy all along the line.

The advocates of commercial union with Canada dined together in Boston, 28th ult. Among the prominent gentlemen present were Senators Hoar and Dawes; Congressmen McKenna, of California; Rogers, of Arkansas; Hitt, of Illinois, and Breckenridge, of Kentucky, and a large delegation from different provinces of the Dominion. The several speeches delivered favored the removal of all artificial barriers to trade between the two countries.

One hundred and ten thousand books, papers and documents showing rates, fares and charges for transportation and arrangements between carriers in relation to interstate traffic have been filed in the office of the Interstate Commerce Commission. In its annual report that body admits that it has been unable to do more than acknowledge the receipt of these papers and to classify and index them. The Commission cannot even begin to revise the schedules, which fact tends to support the plea for the creation of an independent bureau organized on a scale commensurate with the magnitude of the work.

Thirty-five manufacturers representing the Western Window Glass Association met in Pittsburgh last week and reported a good trade in progress with excellent prospects for the spring, on account of the "immense building operations" contemplated. All the glass houses are running full.

Secretary Whitney has accepted the offer of Francis L. Norton, superintendent of the Norton Shipbuilding Company, to furnish a lifeboat to be thoroughly tested on a naval vessel before being purchased by the Government. The Norton boat embodies several peculiarities of construction, the principal departure from ordinary methods consisting in the use of automatic water ballast, which it is asserted renders the boat non-capsizable, while it discharges itself, so as to relieve the davits from strain when the boat is hoisted on board ship.

Traders in New Orleans are rejoicing in the extension of the Illinois Central Railroad, thus giving an all-rail line under one control and management from New Orleans on the Gulf to Northern Dakota, from the northern to the southern boundary of the United States. The last spike was driven in this extension December 19, and New Orleans is now intimately connected with

the productive wheat fields of Dakota. The Sioux Falls *Argus Leader* regards this event as joining the "Crescent City by the Gulf" with the "Queen City of all the Dakotas" and the "Garden City by the Lakes," "portending a mighty future, beneficial alike to all the three cities," and predicts that the wheat and corn and bacon of Dakota will soon be sold in New Orleans, nearly 2000 miles distant.

The United States Consul General, Mr. Bonham, at Calcutta, in his last report respecting the East India wheat crop says he does not agree with some of his predecessors, who thought that the United States had nothing to fear from India as a competitor in the production of wheat. He believes that India is to-day second only to the United States in the quantity produced, and that there is no doubt wheat growing in India is yet in its infancy and its further development depends principally upon the means of transportation to the seaboard. Twelve thousand miles of railway exist in India, and the average annual rate of construction during the past five years has been 662 miles. "The Government of Great Britain is not content with being the great public carriers of the world," he says, "but seems of late years to be possessed of a laudable ambition to produce her own breadstuffs as well." Mr. Bonham regards the competition from Indian wheat as likely to grow more and more severe and the cultivation in India as likely to increase considerably.

A monster wave struck the cliff at Portland Head during the storm last week. It was in the shape of a pyramid and was hurled 60 feet above high-water mark against the big fog-horn house. The force of the blow was such that the building, built as strongly as possible, was bent, twisted and shattered. Great iron stays were snapped as though they had been pipe-stems, and the receding wave carried with it everything on the shore, including stones weighing tons.

The New York City budget for 1888 is \$2,000,000 larger than last year's. The cause of the increase is mainly larger appropriations for new school buildings, better pavements and other necessary improvements. The rate of taxation in consequence will be about \$2.20 per \$100 of valuation, as against \$2.16 last year, an increase of $\frac{1}{100}$ per cent. Mayor Hewitt makes the increase in the tax levy the subject of explanation in his message to the Common Council.

The Nova Scotia Sugar Refinery Company is reported to have made \$300,000 to \$400,000 during the year, chiefly through advantageous purchases of raw sugar before the advance.

The Brooklyn City debt has been reduced \$1,600,000 during the year to \$32,000,000. The city is now in a position to expend about \$4,000,000 on local improvements without exceeding the limit allowed by the State in accordance with its valuation.

The finest cotton in the world is grown in the United States. The best authority says: "The Sea Island cotton is the finest and best kind of cotton produced anywhere, and commands the highest price." The best Egyptian cotton is the next in quality.

The large drawbridge of the International Bridge across the Sault Canal and Sault River was swung into position last week and is working perfectly.

The Interstate Commerce Commission have issued a long opinion on the question raised as to whether express companies are subject to the Interstate law. The opinion reviews the relations of express companies to interstate commerce and the arguments advanced against jurisdiction, and takes the ground that all express companies

should be subject to the provisions of the act, but that under its present terms only such companies as are branches of railroad companies are so subject, and that independent companies are not now included in the terms of the law. For these reasons the question of jurisdiction is referred to Congress.

The Canadian Pacific Railroad's freight business is said to be larger now than ever before, including heavy shipments of grain in bond from the Northwestern States.

Cincinnati has four railroads connected with the coal regions, but coal transportation has been neglected for other traffic, with the result of producing a famine. There are 10,000,000 bushels of coal loaded in barges now going down the river from Pittsburgh for her relief, favored by a rise of water.

The New York and Hartford steamer City of Richmond struck on Diamond Reef, in the East River, opposite Ninth street, and was run ashore to save her from sinking. The usual depth of water at that point is 10 feet. The steamer draws 7½ feet. The rumor that the steamboat had caught fire was caused by the fact that some of the woodwork in the firing-room did ignite when the fires were pulled to save the boilers, but little damage was done.

The fast increasing trade of the great Northern lakes is shown in the retrospect of the year. Buffalo boasts of heavy gains in the receipts of grain and lumber and in shipments of coal and cement, also of the largest rail shipments on record. Lake freights, too, have had a high average, and large vessels are represented to have "literally coined money." The coal movement aggregated nearly 1,800,000 tons, by far the largest amount ever shipped. The westward movement of cement reached 426,000 barrels last season to 85,000 ten years ago. Vessels, instead of returning from Buffalo light or in ballast, now have a profitable cargo. The average up-freight on coal last season was nearly \$1.12 a ton. The receipts of grain reached the enormous aggregate of 103,870,000 bushels, which is the largest movement on record, with the exception of the phenomenal movement of 1880. The receipts of lumber amounted to 270,132,000 feet. The shipments of grain East by canal were 49,226,000 bushels, while the rail shipments, 30,045,000 bushels, show enormous gains, the aggregate for 1886 being only 20,800,000 bushels. The arrivals of live stock numbered 6,680,000 head, which is an increase of over half a million head for the year.

A land corporation has been formed at the Mexican capital, to have branches at El Paso and other points in the United States, with the object of placing upon the market 55,000,000 acres of land in 11 States of the Republic. These lands are adapted to emigrants from any climate on the globe, and to all the products of the temperate and tropical zones. The company have received important concessions from the Government, providing for exemption of settlers from taxes and from liability to military service for a term of years.

Manual instruction will commence February 1 in four of the public schools in this city, the only ones thus far for which the trustees ask for the introduction of the new course. The system in view will differ from that in other cities in that, instead of having separate buildings to which pupils may go from the public schools certain hours in the day, it will be grafted upon the public school system.

Thirty years ago the total merchant marine of the United States comprised in round numbers about 5,200,000 tons, considerably exceeding that of the mother

country. A large number of vessels were sold to foreigners during the civil war, and the total tonnage of the United States to-day is only 4,131,135 tons, while the British total, just published, is 7,361,818. Of this (to show how steam is superseding the sailing craft) only 3,396,516 was sail and 3,965,302 was steam tonnage.

There has been an unprecedented amount of railroad building in 1887 by all the roads in the Northwest. There is scarcely a system that has not pushed further out into the wilderness. The Manitoba has laid the most track, its total being 942 miles, and the "Soo" system comes next with 428. Of the 3534 miles of new road enumerated below, about half is in country tributary to the Twin Cities of St. Paul and Minneapolis. Besides this there have been about 500 miles of roadbed prepared, ready for the iron next year. The record of track-laying is as follows: Manitoba, 942; "Soo" line, 428; Illinois Central, 387; Milwaukee, 371; Elkhorn, 358; Northern Pacific, 310; Kansas City, 306; South Shore, 204; Northwestern, 136; Omaha, 34; Wisconsin Central, 34; St. Paul and Duluth, 15, and St. Louis, 10, making a total of 3534 miles.

Engineers will determine the practicability of erecting a lighthouse on the outer shoals at Cape Hatteras, the most dangerous point on the Atlantic Coast.

Window glass has advanced in price 50 per cent. during the past year, owing to the unprecedented demand, and orders in hand at Pittsburgh are said to be larger than ever before at this season of the year. By the agreement recently made the 2000 glass-blowers get an advance of 5 per cent. in wages. It is understood that the advances will not result in any great importations. It will simply lead to the running of the factories in this country to their full capacity. In Pittsburgh alone there are 15 window glass factories, with a capacity of 900,000 boxes, valued at over \$3,000,000. The substitution of natural gas for coal as fuel in all the processes of glass making has had a beneficial effect.

The engine house of the Equitable Gas Light Company's plant, on Forty-first street, near the river, east side, blew up from some mysterious cause on Saturday night, killing the engineer and wrecking the buildings. The shock was felt for half a mile.

It is stated that the plans for new buildings already filed for construction during the year 1888 in New York City will involve an aggregate cost of over \$66,000,000, being 9,000,000 increase upon the past year.

Natural gas contracts expiring in Pittsburgh with the end of the year are not renewed except at advances in most cases of from 10 to 100 per cent. The companies claim that the advance is simply an adjustment of rates, made necessary because in many instances contracts on which there was sharp competition were taken at a merely nominal price, that was sometimes hardly half the cost of production and piping. There is now a tacit understanding among the different companies supplying this fuel for manufacturing and heating purposes that the rates in future will suffer no cutting.

Minister Hanna sends word from the Argentine Republic that that Government has decided to repeal the export duty on wool, and is eager to welcome any signs on the part of the United States of a disposition to encourage trade.

William S. Crowell, United States Consul at Amoy, Formosa, in his report to the Department of State, comments on the fact that while fully 95 per cent. of the Formosa teas find a market in the United States, only one of the six foreign firms engaged in the trade is American. He regards it as a matter of regret that this

profitable trade should be so largely in the hands of English merchants; and he thinks that American capital should be able to find here a profitable field for investment and ultimately place this trade in American hands, where it properly belongs.

The import trade of San Francisco increased \$2,000,000 during the last eleven months compared with the previous year, but exports fell off nearly \$4,000,000, or about 9 per cent., in consequence of the check in wheat shipments. Trade with the coastwise ports has increased in a remarkable degree.

The death of William Hude Neilson, which occurred Friday at his country seat near Far Rockaway, is widely lamented in this city. In whatever he undertook he became prominent. His business life was exceptionally active, and he enjoyed great popularity and esteem in the commercial and financial world. His service as first president of the Stock Exchange, as it now exists, lasted through three terms, until the Exchange was firmly established. His work as president of the Hannibal and St. Joseph Railroad Company was in itself enough to establish a railroad reputation. For 40 years he took active part in municipal affairs, especially in educational matters. He was president of the Board of Education from 1855 to 1858, as well as from 1873 to 1876. He was for years chairman of the Committee on Normal Schools. His associates speak in the highest terms of the earnestness of his efforts and of the value of his performances in that direction.

A big trust is in course of formation among the manufacturers of commercial fertilizers, and its promoters claim that it is nearly consummated, and that only a few details remain to be arranged before it will be an effective working organization. A low estimate places the annual sales of artificial fertilizers at 1,000,000 tons, or \$30,000,000 worth annually, and the trade is constantly increasing. The business does not yield a satisfactory profit at present on account of bad pay by farmers, the number of commercial travelers it is necessary to employ, and the railroad freights. The trust hopes to do away with these evils.

During the year now at an end the New York builders have erected 4400 buildings at a round valuation of \$67,000,000, clearly beating the records of previous years, notwithstanding the fact that during the closing months of the year hardly any new architectural enterprises of magnitude were started. In 1877 there were erected in New York 1432 new buildings, and a comparative table will give a comprehensive idea of the increased energy and growth of constructional matters on Manhattan Island:

	No. of buildings erected.	Cost of these buildings.
1877.....	1432	\$13,365,000
1887.....	4335	67,000,000

Transactions in real estate were correspondingly large, property having changed hands to the value of about \$255,000,000, and it appears that in no previous year has so much money been loaned on real estate at such a low rate of interest.

A peculiar sight about the iron and steel works in Johnstown, Pa., is the groups of men, women and children that are constantly prodding and digging in the cinder dumps, and are known as "cobble pickers." Cobbles are bits of iron and steel that remain among the cinders from the furnaces, and are dumped with them on the cinder piles. Each picker has his pile of cobbles, and the iron company's teams come around at intervals. The driver weighs the piles, gives each owner a voucher for his or hers, and takes the accumulated metal to the scrap heaps to be melted again.

The Iron Age

AND METALLURGICAL REVIEW.

New York, Thursday, January 5, 1888.

DAVID WILLIAMS, - - - Publisher and Proprietor.
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RICHARD R. WILLIAMS, Hardware Editor.
JOHN S. KING, - - - Business Manager.

Volume XLI.

The change of shape and typographical dress which signalizes the beginning of Volume XLI of *The Iron Age* will, we trust, be satisfactory to our readers. It has been long evident that such a change was desirable, but it has now become a necessity. Until 1873 *The Iron Age* was published in folio size. As a four-page paper it was admirable; but as pages multiplied it became unwieldy, and our readers complained that it was awkward to handle and impossible of preservation. The change to the shape with which our constituents have been familiar for 15 years was a decided improvement, and permitted current filing and binding of volumes; but the volumes soon grew to such proportions that they could not be handled conveniently, nor accommodated in an ordinary store or office. The change we now make was desired by so large a proportion of our readers and advertisers as to warrant us in saying that it will command unanimous approval.

That the convenience of the trade is greatly promoted by the change is obvious; it will also be evident that the interests of the advertiser are furthered by it. *The Iron Age* in its advertising pages has more of the characteristics of a trade directory than of an ordinary newspaper, and must accommodate such a mass of advertising every week that a satisfactory commingling of reading matter and advertising matter has become impossible. The reading matter is now concentrated, and the advertisements will be classified as accurately as is possible in view of the many unusual conditions to be provided for.

The conductors of *The Iron Age* congratulate the great productive and distributive industries represented by it upon a fair business outlook for 1888, and feel that no other announcement is necessary than that this journal will continue to be as useful and valuable as it has been for more than a quarter of a century.

We print elsewhere a list of the wire-nail manufacturers of the United States. Though it cannot claim to include all of the makers, it certainly does embrace every important establishment. Figures collected show the aggregate number of the machines enumerated to be 1451, while estimates of the equipment of those not sending returns justify the statement that the total number of machines is not less than 1600. It is a matter much to be regretted that thus far wire-nail manufacturers have shown a disposition to withhold statistics. Some time since the American Iron and Steel Association made an effort to procure the figures, but failed. We have little

doubt that their reticence has done much toward plunging the trade into the unfortunate condition in which it now is. The wire-nail manufacturers invaded fields already fearfully overdone, the field hitherto almost exclusively occupied by the cut nail, and the territory lying between the tack and the nail. It might be expected that under such conditions a very sharp contest would take place. Yet the makers of the wire nail attempted for a while to hold prices by a combination, which soon collapsed and only had the effect of allowing new concerns to secure a footing. Had it been known a year or two since, and at regular intervals afterward, what they were doing in the way of output, it would have been easier to dispel erroneous ideas. Considerable capital has been diverted into the industry by the oversanguine, and in some cases by the false representations of promoters and others. While it would have been impossible to entirely stop such a movement, it is likely that a general knowledge of undisputed facts would have acted as a salutary check. Even now, at a time when the demoralized condition of the markets should teach its own lesson, it is not out of place to utter a warning against new undertakings of this character. It would be satisfactory to be able to state that the worst days of the struggle are over, but an unbiased review of the situation will quickly dispel that idea.

The Question of Steel Scrap.

It is only in recent years that there has been any serious question raised as to the disposal of steel scrap. When the use of steel was quite limited, which however incredible it may now seem was so recent as 1870, the separation of steel from iron scrap was rendered an easy matter by the form of the piece or by its superior finish as compared with similar articles made of iron. The introduction of cheap processes for the manufacture of steel and the rapid substitution of steel for iron have changed all this, and the discrimination between steel and iron has become a test of expert knowledge, with a very fair chance of the frequent embarrassment of the most skillful and experienced. In some classes of manufacture this is a serious matter, as, for instance, in forging iron car axles, heavy cranks, locomotive frames, and all that class of work in which scrap iron is fagoted or welded into huge masses or special shapes under the hammer. If a piece of steel should be accidentally included an imperfect weld will result, with possibly great loss or damage as the consequence.

When cheap steel first began to be substituted for iron the fear was expressed among consumers that as the articles made from it were worn out there would be no use found for the scrap. It could not be reworked as easily and simply as old iron, and if it possessed no value as scrap its advantages over iron in point of increased service and greater strength were counterbalanced by this economic defect. The introduction of steel rails was quite seriously opposed on this ground, it will be remembered, by many railroad officials, who were supported in their views by the manufacturers of iron rails. It was argued that old steel rails would be entirely worthless when they were worn out, and even

though they might last two or three times as long as an iron rail, the money invested in them was absolutely sunk; whereas, in the case of iron rails, a considerable proportion of their cost was always certain to be realized whenever they were pronounced unfit for further service in the track. But this objection to steel rails proved futile to stay the steps of progress in this direction, and the question as to what would become of the old steel rails was left to the solution of time. And time is solving the problem without special difficulty. Old steel rails are now coming on the market in appreciable quantities, increasing from year to year, but finding a demand for certain uses which seems to grow in proportion to the supply. It is true that the price realized for old steel rails is not so high as for old iron rails, but this is not a serious matter to the railroad companies selling them when the advantages attending the use of steel rails are taken into consideration.

The same objections are now being urged to the use of soft steel as a substitute for iron in other directions. Railroad companies having their own construction and repair shops hesitate to introduce soft steel for sundry purposes in which it has obvious advantages over iron lest their scrap should be hopelessly intermingled, to the detriment of the forgings which they turn out. In this case there is more force in the objection than with regard to steel rails. It is much more difficult to determine which of two unmarked bars or rods is steel and which iron than of two rails, both of which probably bear the maker's name and the year in which they were rolled, and perhaps other means of identification. But this objection is not a fatal one to the use of steel for such purposes. It has been proposed that wherever possible the finishing rolls for steel shapes should have the word "steel" cut in them, so that it would appear in the rolled product at least once in every foot. This would make the detection of steel an easy matter in assorting scrap, and if steel manufacturers would adopt this system of working their product an important step would be taken toward its approval for uses from which it is now debarred. Of course all forms of steel could not be thus marked, but a very considerable proportion could be, especially those which are liable to be thrown in a railroad scrap heap.

As the use of steel increases in the direction specially referred to there will be an increasing quantity of it thrown on the market, because much of it will require special appliances for reworking it. This will be another problem to be solved in the future. Possibly the increasing number of open-hearth steel furnaces may afford an outlet for such material, which is necessarily of good quality. Rolling mills making small steel specialties may also find it economical to purchase selected steel scrap suitable for their requirements, which can be rolled down after a simple heating. It is also possible that our untiring experimenters will yet find a process by which steel scrap can be welded as satisfactorily as iron. Whatever the outcome may be, however, the prediction seems perfectly safe, despite the present light demand, that steel scrap will be utilized in our industrial economy as rapidly as it becomes more and more a part of our regular supply of old material.

Progress of Victoria.

Considering the comparatively small importations of ours from Australia, \$4,411,119 the last fiscal year, and \$3,859,360 in 1886, Australia takes American goods freely, \$9,543,474 in 1887 and \$10,981,915 in 1886. The Melbourne Exhibition this year will, therefore, be of considerable practical interest, and it is to be hoped that American manufactures may be amply and creditably represented there, as the show will be visited not only by merchants and consumers of Victoria, but also by those of the other Australian Colonies. Although Victoria is one of the smaller colonies at the antipodes, it is, next to New South Wales, the most important in consequence of the extraordinary progress which it has made. Victoria was separated from New South Wales in 1851, and covers an area of 87,384 square miles, or 56,245,760 acres, occupying about a thirty-fourth part of the surface of the Australian continent. Its climate is the most genial to be met with in that part of the world, the mean temperature at Melbourne being 56.6°, the mean rainfall being 25.65 inches. The population of Victoria was only 177 in 1836; in 1861 it was 540,328, and on June 30, 1886, 1,009,753. Melbourne has a population of 360,000. The revenue of the colony was £4,325,156 in 1876, in 1886 it had risen to £6,290,361, while the expenditure was respectively £4,572,843 and £6,410,356. The public debt amounted to £30,127,382 on June 30, 1886, money invested in railroads and other public works. The number of acres under cultivation in 1886 was 2,405,157. Wheat produced in Victoria in that year was 9,170,538 bushels; oats, 4,692,303 bushels; potatoes, 164,202 tons; hay, 442,118 tons. The Victorian wool produced amounted to 61,369,000 pounds, valued at £3,829,619. The total quantity of gold raised from the date of the first discovery in 1851 is estimated at 53,728,000 ounces, which, at £4 per ounce, gives the value as £214,912,000.

Victoria, as a manufacturing country, occupies a pre-eminent position in the Australian group. The manufactories and works returned in 1885 numbered 2855, the hands employed therein 49,393, and the capital invested £10,199,918. There are 1680 miles of railway completed and in full operation. The construction of 1216 more miles has been authorized. There are 3949 miles of telegraph lines open, and 9617 miles of wire. Stage coaches run to all parts of the colony where railway communication is not available. On December 31, 1885, there were no less than 13 banks established in Melbourne, having altogether 366 branches in the colony. The deposits at that date amounted to £30,593,500, and the value of the notes in circulation to £1,474,800. There are also 250 Government savings banks throughout the colony. The number of accounts open at the end of the year was 155,000, and the amount on deposit was about £3,000,000. The legal tender and usual currency is exclusively British sterling. A branch of the Imperial Mint is established at Melbourne, where a large amount of gold is coined annually.

In 1884 there were 1803 State schools, with a total enrollment of 222,054 scholars, instructed by 4199 teachers. The land forces at the end of 1885 comprised an es-

tablishment of 5640 men of all arms, of whom 184 were officers.

The trade of the colony showed the following movement in 1875 and in 1885:

Imports.	Per capita.	Exports.	Per capita.
1875. £16,685,874	£21. 3/10	£14,766,974	£18. 15/1
1885. 18,044,604	18.10/11	15,551,738	15. 18/11

The most remarkable feature is the enormous trade done by so small a population—a circumstance which characterizes all Australia—arising on the one hand from bountiful resources, and on the other from remarkable individual thrift and activity. Melbourne, the metropolis, is distant from Sydney by sea about 570 miles and by land 574; from Adelaide by sea 482 miles and by land 575. It is connected both with Sydney and Adelaide by railway. Steam postal communication with England, via Ceylon and Suez, is maintained weekly by the steamers of the Peninsula and Oriental Line, alternating with those of the Orient Company. Mails are also carried by the lines of steamers belonging to the Pacific, British India and Messageries Maritimes (French) Companies. By the Chinese act of 1881 a tax of £10 per head is levied on Chinese immigrants.

Australia generally has been benefited a good deal by the advance in wool in 1886, and in tin, as well as to a moderate extent in copper in 1887. Even the advance in sugar is quite a gain vouchsafed the Queensland planters, who turned out 55,796 tons in 1885, and last year probably made 60,000 tons. Hence, it may be asserted that the continent of Australia, together with Tasmania, were seldom as flourishing, taken as a whole, as they are at present. The people down there are consequently most desirable customers for American hardware, &c., the more so as nobody down there expects our exporters to grant credit, in which respect Australia differs materially from certain West Indian and South American countries with which we deal. It is, indeed, the kind of export trade we should assiduously cultivate.

The Belgian press has for some time sharply attacked Krupp, and indirectly the Belgian Government, which has thus far persistently adhered to the use of his guns. The *Moniteur des Intérêts Industriels*, which has taken the lead in this crusade, takes the ground that home manufacturers should be given an opportunity to supply the needs of the country, and as the preliminary step toward attaining that end has made a number of assertions unfavorable to the great German firm. The latter has been goaded into a reply, a step which, by the way, the late founder of the works would never have consented to. The burden of the strictures of the Belgian critics was that Krupp does not exclusively use crucible steel, as he claims to do, and that his guns are far from being so mysteriously superior to those of other makes as they are made to appear. The drift of the argument is that Krupp's real or pretended secrets of manufacture are not necessarily the only means of getting at a good result, and that after all the Krupp cannons have failed in many cases. The firm of Friedrich Krupp replies that during the last 17 years not a single one of their cannons has burst, that it is false that they use any open-hearth

steel in the manufacture of guns, and that they have retained crucible steel as their material because the homogeneity and uniformity of Krupp crucible steel cannot be attained by either of the two other methods of steel manufacture. Responding to this somewhat general and sweeping denial, the writer in the *Moniteur* quotes a number of metallurgical authorities and ordnance officers on the points at issue, the relative value of crucible and open-hearth steel as material for gun manufacture, and the claim that crucible metal is exclusively used by Krupp. Among others the statements of American officers in published reports are quoted. It is fair to say that in every instance they seem to us merely surmises. Actual proof is not brought forward. On the question of the record in service of the Krupp guns the official documents quoted seem to leave little doubt that the broad assertion of the firm is not warranted by the facts. Probably the policy of secrecy persistently followed by Krupp for many years has not a little to do with awakening the suspicions to which eminent men have given expression. It has certainly placed weapons in the hands of their detractors which they have not been slow to use. To Americans the quarrel has only interest so far as it deals with the subject of gun material. We are now using open-hearth steel and are getting ready to proceed with it in the manufacture of guns on a larger scale. If Krupp has evidence to prove that crucible metal is so much superior, as he claims it to be, our gunmakers and the Ordnance Department will be content to accept a change when once convinced.

The Steel-Rail Trade in 1887.

The year 1887 will undoubtedly rank for some time to come as the banner year in the steel-rail trade, the capacity of practically every mill in the country, old or new, having been fully utilized at remunerative prices for the greater part of 1887. While it was exceptionally active so far as manufacturing was concerned, it was quiet, and only moderately eventful, so far as the commercial part of the business is considered. This is largely due to the fact that over one-half of the business for 1887 had been done in the closing months of 1886; the sale of rails of standard section by the companies in the rail association aggregated not less than 1,032,850 gross tons. Early in the year the allotment was increased to close to full capacity, as will be seen from the following table, which is compiled from the monthly returns of the Board of Control, a number of the figures submitted now having been printed from time to time in our weekly market reports:

Sales and Allotment of Steel Rails.

	Sales.	Allotment.
Up to January 1.....	1,032,850	1,432,036
Up to February 1.....	1,305,140	1,688,684
Up to March 1.....	1,442,891	1,948,851
Up to April 1.....	1,494,384	1,948,851
Up to May 1.....	1,598,048	1,961,139
Up to June 1.....	1,614,545	1,964,258
Up to July 1.....	1,695,055	1,969,798
Up to August 1.....	1,770,449	1,970,444
Up to September 1.....	1,816,444	1,988,711
Up to October 1.....	1,833,126	1,988,929
Up to November 1.....	1,861,998	1,909,341
Up to December 1.....	1,898,444	2,098,444

It should be stated that these figures do not include sales of rails running under 40 pounds in weight and that they do not embrace the sales of two works, the Color-

ado Coal and Iron Company, at Pueblo, and the Roane Iron Company, at Chattanooga, nor those of a few mills rolling rails from imported or domestic blooms. It should be stated, too, that toward the end of the year a number of contracts were canceled and an important aggregate of deliveries was postponed from 1887 to 1888. The following table gives the shipments, which, it will be observed, are considerably behind the sales, and far below the allotment. This is principally due to the fact that some of the mills were undergoing remodeling earlier in the year, so that they did not come into play until the second half of 1887:

Shipments of Steel Rails.

Up to February 1	104,226 gross tons.
Up to March 1	235,160 gross tons.
Up to April 1	389,532 gross tons.
Up to May 1	564,403 gross tons.
Up to June 1	747,181 gross tons.
Up to July 1	907,351 gross tons.
Up to August 1	1,045,048 gross tons.
Up to September 1	1,219,717 gross tons.
Up to October 1	1,390,825 gross tons.
Up to November 1	1,569,033 gross tons.
Up to December 1	1,726,108 gross tons.

The work from month to month is shown in the following table:

Monthly Shipments and Sales of Rails.

	Shipments.	Sales.
Previous to January 1	1,032,850	1,032,850
January	104,226	270,290
February	130,934	139,751
March	154,370	52,493
April	174,871	103,664
May	182,778	16,497
June	160,176	80,510
July	137,691	75,394
August	174,669	45,995
September	171,108	16,682
October	178,208	28,872
November	157,065	36,446
Total	1,726,108	1,898,444

It may be observed that the shipments monthly do not, of course, coincide with the production. The mills generally accumulate finished product during the winter months, which is sent out in spring. This is clearly shown in the heavy shipments of April and May. The production of the first six months, according to Mr. James M. Swank, was 1,030,530 gross tons, while the shipments during the same period from the works of the association aggregated 907,355 tons. It is probable that the returns of August, September and October well represent the producing capacity of the country, of standard rails, by all but two of the mills. This would indicate a capacity of 2,100,000 gross tons for them. Adding a liberal allowance for new mills built, the total may be placed at 2,250,000 gross tons, against 2,000,000 tons a year since.

The figures of sales given in the above will convey some idea of the relative activity during the different periods of the year. January opened with prices nominally \$37.50 to \$39 at Eastern mills, figures relatively higher than those demanded in the West. Thus a lot of 10,000 tons for a Western trunk line was placed at \$39.50, quotations at Chicago being \$40 to \$42.50. During the month some heavy sales of English rails were made, lots aggregating 40,000 tons being placed on the Pacific Coast, while 6000 tons were taken at New Orleans at \$40.50. February witnessed few sales for Eastern delivery, but heavy contracts were placed in the West, while English works were credited with selling 10,000 tons to the Texas and Pacific Railroad. Toward the end of the month, however, a disturbing factor appeared in the form of lots aggregating about 30,000 tons, offered for resale by speculators and

contractors. Prices, which had been \$39 to \$40 at Eastern mills, at which but little business was done, sagged to \$38.50 to \$39 in March. That month was quiet, but again recorded a heavy sale of English rails, a Northwestern road being reported as the purchasers of 30,000 tons. In the East, where the mills were practically filled with work for months to come, the hawking of lots from second hands imparted a tone of weakness to the market, this state of affairs continuing into April, which was characterized by heavy sales, chiefly by Western mills, to Western and Southwestern railroads. Contracts for 10,000 tons of English rails were made for the Pacific Coast and smaller sales for the Gulf. Toward the close of the month quotations in the East had receded to \$38 for later delivery, the market remaining stiff for early sales. May was quiet East and West until the close of the month, when it became very active in the West, blocks aggregating over 40,000 tons being placed with Southwestern roads at \$42, St. Louis. June opened with rails in the East at \$38 to \$39, according to time of delivery, while foreign rails were selling at \$40 at New Orleans. During the month European producers sold 20,000 tons for the South and Southwest, one lot at \$40.50 at New Orleans, and 15,000 tons for the Pacific Coast on the basis of \$45 at Portland, Ore. The Western mills in the meantime were considerably embarrassed by the coke strike. The month closed with some shading by Eastern mills for later delivery, a few round contracts being placed.

July witnessed a spread in the cutting, a sharp contest being made with sellers of foreign rails for Gulf and Pacific Coast delivery, some round lots being captured; \$37.50 became an open quotation for fall work, though prices went down to about \$35 at mill for competitive business. Early in August the annual meeting of the Steel Rail Association was held, and, while there were considerable differences of opinion in regard to necessity of lower prices made, an agreement to continue the allotment plan was entered into. The month brought a fair amount of business, but as winter work came forward very slowly prices weakened, \$36 to \$36.50 becoming open quotations for fall delivery, and \$37.50 to \$38 for early work. In September the attitude of buyers became more pronounced in favor of holding off at all hazards, and the unfavorable reports in regard to the continuance of railroad extensions began to tell on prices, which declined to \$35 for fall and winter deliveries, while prompt shipments remained stiff. Sales for 1888 delivery were very small, being made on the basis of \$34 at Eastern mill. October brought a weaker and more unsettled feeling, quotations falling to \$34 to \$35, with many rumors of the closing down of mills and reports of contemplated action on the part of producers. The close of the month, however, witnessed considerable selling to Eastern roads for 1888 delivery, the bulk of it at \$32 to \$33, but some as low as \$31.50. Meanwhile deliveries on old contracts were being delayed and in some instances were being canceled, and November opened with a gloomy outlook. The mills endeavored to stay the growing demoralization, departing from principles long adhered to, by reaching an under-

standing not to sell below \$32 in the East and \$36 Chicago, at the same time giving the Board of Control increased powers. December brought some heavier business, but till its close some of the leading railroads remained firm in their attitude of expectancy, and prices were not maintained, \$31 being openly quoted in some instances.

The year closes therefore with an outlook differing greatly from that a year since. Still the fact that very heavy orders are withheld which are usually placed weeks before the close of the year makes affairs now look more gloomy than they really are. There has been a prolonged contest of endurance between buyers and sellers, with the advantages apparently on the side of the former. Makers, on the other hand, look for compensating advantages from their present enforced idleness. Wages have even now given way, without any serious struggle thus far, but raw materials like ore and fuel must come down considerably more if costs are to remain in anything like a fair relation to prices.

It is not expected, nor is probable, that the demand will be as great in 1888 as it was in 1887. To give our mills full employment we must add at least 11,000 miles to our railroad system, and that the most sanguine do not look forward to.

Engineering prints a vigorous, and, on the whole, a satisfactory, refutation of the charges that the Paris exhibition of 1889 is in the hands of the same or a similar class of men as was the notorious Paris Railway Jubilee Exhibition. The wretched collapse of the latter was a fearful warning to foreign manufacturers, who at a distance cannot be expected to be able to judge whether a long list of prominent manufacturers, dignitaries and officials are or are not merely a cover for irresponsible *chevaliers d'industrie*. The railway exhibition was backed amply by apparent official and industrial support, which was almost stealthily withdrawn only when the collapse was evidently impending. It is not surprising that suspicion was created in the *bona fide* character of the greater undertaking. This suspicion *Engineering* has undertaken to remove, and, we may add, has succeeded in doing so. Let our contemporaries go a step further and dispel the rumors which are coming thicker and faster that the managers of the enterprise have undertaken more than they can carry out, that, for instance, the famous Eiffel tower is to be abandoned. Conceding, however, that the exhibition is going to be all that its managers claim for it, the fact remains that the principal European nations will not take part in it. *Engineering* explains this point by stating: "Admitting that the date of the exhibition will coincide with the *fetes* to be held to celebrate the centenary of the French Revolution, it was not to be expected that the spontaneous and enthusiastic adherence of monarchical governments would be found, and republics alone could with propriety be represented officially." We must be very much mistaken in the power which trade interests wield in shaping the course of the English Government if we are to believe that purely formal considerations of such a character would prevent official representation on the part of Great Britain, provided any commercial advantages were in sight. The plea will naturally be made by those urg-

ing our Government to give the exhibition its support that the occasion is one which calls for active expressions of good will and sympathy, and we are convinced that after due investigation the sentiment of this country will be overwhelmingly favorable to a worthy representation. But manufacturers individually will carefully weigh the advantages of exhibiting before they will commit themselves. In iron, steel, hardware and metals we sell very little to France, and we cannot hope for much business from the crowds of sight-seers who will make the exhibition a pretext to visit Paris. An excellent opportunity may be offered to those who have inventions, novel appliances or machines or tried new methods of manufacture to bring before foreign producers or capitalists. But those who hope to introduce staple or fancy goods will find with few exceptions that the outlay is in excess of the returns, direct or indirect.

As was to be expected, the rapid advance in metals has brought out a large number of new mining schemes, the majority of them seeking capital in the London market. Among them is the Namaqua United Copper Company, a concern which has been working deposits near the famous Cape copper mines, Cape of Good Hope. These mines sold in 1885 1446 tons of 30 per cent. ore; in 1886 1954 tons of 31½ per cent. ore, and in 1887 close upon 4000 gross tons of 32 per cent. copper ore. The property is offered at £210,000, of which £60,000 in shares are to go to the vendors as part payment, £100,000 being paid in cash. Another concern is the Coosheen Copper Mining Company, in the County of Cork, Ireland, which has a capital of £30,000. An Australian property entitled the Mount Perry Copper and Reid's Creek Gold Mines and Smelting Company, Limited, will make copper mining a part of its business; the Kilkivan Mines, of Queensland, are in the market with £120,000 capital, to hunt for gold, silver and copper in Queensland, which are to include the Mount Coora mines and smelting plant, the sellers to obtain £50,000 cash, £40,000 on shares. This is one week's crop only, not to mention a number of tin and lead mines in different parts of the world. It is likely that the next month or two will witness a tremendous influx of anxious sellers of metal mining property into London, with every chance of a great harvest for the promoters and "Guinea pigs." All the reports of public companies interested in the extraction of copper and tin teem with enthusiastic promises for future large dividends to the shareholders, and, what is more directly of interest to the metal trade, show naturally the indications of an intense anxiety to rush production as much as possible. From both London and Paris come reports of an extraordinary rise in the shares of copper mines. Thus Vigsnaes, Norwegian mines, which have paid no dividend since 1884, jumped in one week from 112 francs to 240 francs in the Paris market; one of the great Spanish mines rose from 155 francs to 170 francs in two days, and Rio Tinto jumped 150 francs in a week, reaching 562 francs, one of the newspapers predicting a rise to 1000 francs. The latest advices, however, report a sharp decline toward the end of the year. The famous Société des Métaux,

successors to the firm of Leveissiere & Secrétan, advanced from 685 francs to 830 francs in a week, after the announcement of an interim dividend of 20 per cent. The latter company is the one which is generally credited with having taken the initiative in forming the now famous French syndicate. If those who are responsible for the rise in metals have succeeded in unloading heavily of copper stocks during the past craze they can well afford to see the extraordinary figures for the two metals shrink considerably while they are selling their accumulations.

The Wire Nail Manufacturers of the United States.

Among the phenomenally rapid advances made by some of the departments of the iron trade in its history in the United States, the growth of manufacture of wire nails in 1887 will take high rank. While the result of the rapid increase in the producing capacity has told in the great decline in the prices, we question whether there are many manufacturers even who have a correct idea of the very great number of machines now in the country. It is known in a general way that there are quite a number of large plants whose capacity is probably fairly gauged. Men in the trade are aware of the fact, too, that there are a good many small concerns. We have endeavored to collect some information on these points, and while our data are far from being complete, we offer them as a contribution of some value, since they throw light on an important subject. The simple effort of collecting a complete list of the manufacturers is full of difficulties, since reports of new concerns crop up almost weekly, and because many of the smaller works do only a limited local business, so that they are practically unknown to the trade at large. Some have already gone out of business, others have sold their machinery to larger concerns, and, from some quarters we are informed that equipment is offered for sale. Believing that the magnitude of the business could best be fairly represented by the number of machines in operation, we have endeavored to append to our list the number at each mill. As will be seen, we have met with some hesitation to reveal data of this character on the part of some of the manufacturers. In certain instances a positive refusal to give the information asked for has forced us to seek it through other channels, but, with a few exceptions, the figures given below are the direct official returns of producers themselves:

LIST OF WIRE NAIL MANUFACTURERS IN THE UNITED STATES.

<i>Massachusetts.</i>	
	Number of machines.
American Tack Co., Fairhaven.....	25
Bradford Brothers, Brockton.....	6
George A. Carter, Brockton.....	6
Clark & Dow, Haverhill.....	15
Cobb & Drew.....	2
Frank Cushing, Brockton.....	4
Dunbar, Hobart & Whidden, So. Abington	31
A. Field & Sons, Taunton.....	15
Perkins Brothers, Bridgewater.....	15
E. Phillips & Sons, So. Hanover.....	3
Spencer Steel Wire Nail Co., Spencer.....	4
Taunton Tack Co., Taunton.....	13
W. E. Trufant, Whitman.....	16
The Wire Goods Co., Worcester.....	100
West Dennis Tack Co., West Dennis.....	2
<i>Rhode Island.</i>	
American Screw Co., Providence.....	..
<i>Connecticut.</i>	
Bryant Nail Co., New Haven.....	..
Birmingham Wire Nail Co., Birmingham..	..
Excelsior Wire Nail Co., Seymour.....	21
Clark & Cowles, Plainfield.....	1
Russell & Erwin Mfg. Co., New Britain...	42
<i>New York.</i>	
Brooklyn Wire Nail Co., Brooklyn (estimated).....	60
J. Wool Griswold, Troy.....	4

W. Hassall, 63 and 65 Elizabeth st., New York (chiefly escutcheon pins).....	..
Hoag & Titchener, Binghamton.....	4
Metropolitan Wire Nail Co., 312 and 314 East Twenty-second st., New York.....	12
Sweet's Mfg. Co., Syracuse.....	26
New York Wire Nail Co., 12 First st.....	..
Farmer Mfg. Co., Penn Yan.....	..

Pennsylvania.

Excelsior Tack Works, P. Richards & Son, Nicetown, Philadelphia.....	3
Hartman Steel Co., Beaver Falls.....	104
Meadville Wire Nail Co., Meadville.....	..
New Castle Wire Nail Co., New Castle.....	65
Pennsylvania Tack Co., Norristown.....	..
Philips, Townsend & Co., Philadelphia.....	58
Pittsburgh Wire Nail Co., Pittsburgh.....	50
Bertolette & Lukens Mfg. Co., 216 S. Fourth st., Philadelphia.....	23
W. P. Townsend & Co., New Brighton.....	20
Williamsport Iron Nail Works, Williamsport.....	2

Maryland.

Chesapeake Mfg. Co., Baltimore.....	14
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Ohio.

Cincinnati Wire Co., Cincinnati.....	75
Wetherald Wire Nail Co., Findlay.....	60
H. P. Nail Co., Cleveland.....	150
Salem Wire Nail Co., Salem.....	78

Kentucky.

American Wire Nail Co., Covington.....	53
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Illinois.

Ashley Wire Co., Joliet (to barb-wire trade).....	3
Chicago Wire Nail Co., Chicago.....	..
Illinois Wire Nail Co., Chicago.....	10
Lenz Wire Nail Co., Belleville.....	11

Indiana.

U. S. Wire Nail Co., Indianapolis.....	98
Putnam Wire Nail Co., Greencastle.....	7

Iowa.

McCosh Iron and Steel Co., Burlington.....	60
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Missouri.

Freeman Wire Co., St. Louis.....	..
Southern Wire Co., St. Louis.....	50

Michigan.

Standard Nail Co., Detroit.....	..
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Nebraska.

Omaha Barb Wire Co., Omaha (machines offered for sale).....	4
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Minnesota.

Northwestern Nail Mfg. Co., Minneapolis.....	3
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California.

Pacific Iron and Nail Co., San Francisco.....	4
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Tennessee.

Union Iron Works Co., Chattanooga, Tenn.....	4
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The aggregate number of machines reported is 1421. Among those whose returns we have not got—the works of moderate size—are those of A. Field & Sons, of Taunton; the American Screw Company, of Providence; the Freeman Wire Company, of St. Louis. The others, so far as we have been able to learn, are small. We estimate that the total number of machines of these plants is not less than 175, and possibly may be 200. It is evident, therefore, that there are now in the United States not less than

1600 WIRE NAIL MACHINES.

a number which we feel convinced is far greater than the majority in the trade believe. This does not count in a number of machines run by some large consumers themselves. Nor does it take into consideration the fact that our list is not complete. We may state that such as it is it is only presented provisionally—that we shall be indebted to any of our readers for additions and corrections, so that we may publish a revision of it in the near future.

It should be stated, in justice to many of the manufacturers in the list published, that the number of the machines does not necessarily furnish a guide to the relative importance of their operations. Some of the smaller works run exclusively on some specialty, making fine sizes, &c. Then there appear wide differences as to the capacity of different makes of machines to produce nails. In response to inquiries we have obtained a number of data on the fluctuations of the make of

different sizes. A Western manufacturer sends us the following:

	Average per 10 hrs. Pounds.
No. 1 Whitney, cutting 2d Fine to 3d common.....	150
No. 2 Whitney, cutting 4d Common to 6d common.....	430
No. 3 Whitney, cutting 7d Common to 9d common.....	760
No. 3½ Whitney, cutting 10d to 12d common.....	1100
No. 5 Whitney, cutting 16d Common to 60d common.....	1800

Another Western manufacturer states that his machines will average 16 kegs per week. A third maker puts down his average at 3 kegs per day per machine, principally of the smaller nails, running from 3d fine to 6d. A Western works, running on the Sweetser machine, reports a daily average of 3 to 4 kegs, making only the smaller nails from 10d down. An Eastern maker, using largely his own machines, makes over 600 pounds per machine per 10 hours, of all sizes, while another reports 200 pounds per day on an average assortment. Another concern, running chiefly on small sizes, makes its average 100 pounds per day of 10 hours. A tack manufacturer makes the average product of his machines fluctuate between 800 pounds of 10d 3-inch by 10, to 100 pounds, 3d fine, 1½ inch by 16. A Massachusetts mill places the average make of fine nails up to 6d at 150 pounds and of nails from 6d to 10d at 350 pounds per day. These figures, it will be observed, relate chiefly to the smaller sizes.

From a number of letters which we have from manufacturers we may quote the following as bearing upon the present condition of the wire-nail industry and its future. A manufacturer in New England writes as follows:

"The outlook is anything but encouraging, with the war of the cut-nail manufacturer on one side and small firms starting up at every cross-road. There is no possibility of the price of nails improving at present, as that would only encourage more people to go into the business, and the attack of the cut-nail men will tend to check the increase of demand, if not to actually decrease it, so the market will probably be in the condition that it is now for some time. The experience of the cut-nail men gives little encouragement of other people stopping their machines and leaving the market to us. Another factor to be considered is that it takes comparatively small capital to go into the business."

One of the concerns which went into the business years ago, but since sold out, ends a review of the past with the following remarks: "To wire-nail manufacturers who are interested in the future of the trade, we take the liberty to suggest that a study of the past history and present condition of the cut nail and tack trades would be very instructive, if not entertaining."

A small manufacturer writes: "I think the large firms are acting foolishly in running down the prices as they are doing, thinking to cripple small firms. I sell all I can make and am full of orders at the present time."

The following interesting letter reviews the situation from the standpoint of a tack manufacturer:

"We have not sought trade for standard wire nails—say, the penny nails—therefore have made few, except brads and finishing nails to supply our customers. We ran machines on brads, finishing nails, cigar box and chair nails and box nails before we went into the Central Mfg. Company, 1882. Under the contract of that organization we made prices for all above so high that the wire-nail manufacturers undersold us and so took away from the tack manufacturers a good deal of their regular trade. We were forced into the wire-nail manu-

facture to hold our customers on tacks and other goods, as the wire-nail manufacturers made not only brads and finishing, but cigar box, chair nails, &c., and even shoe tacks, carpet tacks, and every kind of tack and nail they could sell to the customers of the tack manufacturers who had placed their prices so that there was a good margin on their sales. Tinned carpet tacks and tinned broom nails, &c., were largely made by wire-nail manufacturers, and the tack people suffered severely from the 'marvelous' greed, as well as 'marvelous growth' of a new industry. Let us say here that the wire-nail manufacturers have built up their business by underselling the cut-nail people and tack manufacturers, who had so much competition among themselves. They were making no profit, selling cut nails under \$2 a keg delivered in New York City, while the tack manufacturers had been driven into a strong combination to avoid ruinous competition among themselves. The competition of the wire-nail manufacturers helped to close up half of the cut-nail mills in New England, and to materially reduce the production of nail mills in the West. This may seem an overstatement of the influence of the wire-nail business, but the production of 1,000,000 kegs of nails from a new source and the placing, or rather forcing, of them on the market at very low prices has had a very demoralizing effect on buyers as well as producers of cut nails. Wire nails are now quoted at less than actual cost, as results will in time demonstrate. We think that altogether too much credit has been given to the wire-nail manufacturers. If their mission is to make manufacturing of nails and tacks unprofitable, then they should be awarded great praise, for they are doing their work wonderfully well. That the demand is increasing for the wire nails is unquestioned. Every mail brings to us inquiries for prices, but when we quote our cost and a fair margin we get reply they are quoted much lower, and receive an order for a few brads and finishing nails. We buy of the large manufacturers who are making the low prices, when they or we have to sell the penny nails to hold some customers who must have them. We believe the cut-nail people will so cheapen their steel nails as to hold their trade, except when wire nails are offered for less than cost for common work, and also for much of the fine work the wire-nail manufacturers took from them."

These letters will convey some idea of the complexities of the situation, and yet they do not touch on some very important considerations. The one great point, which we have been particularly eager to bring out, is the large number of works already running and the heavy producing capacity, which seems to hold out little promise for the immediate future for any new concerns. There are indications that the condition of the industry, the possible profits to be obtained by entering it and the future before those engaged in the trade have been very greatly exaggerated. The result has been a rush into this line of manufacture, which has not yet ceased. However great may be the merit of the wire nail for certain uses, it is evident that the business is now greatly overdone, and that those whose who persist in entering it will find their experience costly, and will only add to the perplexities of those already engaged in the trade. The factors at work in shaping the future of the trade are complex. As in other lines in which wire is the raw material, there is a sharp contest going on between the concerns who do their own wire drawing and the mills who must go into the open market to purchase their supplies, and going back further still, among those who roll their own rods and the concerns which must buy foreign or domestic wire rods. The larger works,

thus equipped, must necessarily be the ones which, looking to handling a large tonnage output, must make chiefly those sizes which compete directly with cut nails. This means necessarily low margins, since, in times of a sharp contest, they can and do sell as closely as the bunching of profits on intermediate processes of manufacture will permit. Broadly, the question is this: Can or cannot the wire-nail manufacturer make and sell a given quantity of nails, the equivalent to the consumer for doing a given amount of work, cheaper than the quantity of cut nails capable of doing the same amount of work? Starting, as they do, with raw material practically equal in cost—that is, the steel billet and the slab—is it cheaper, making due allowance for the relative value per pound to the consumer, to roll a slab into nail plate and produce cut nails, with all the waste that brings, or is it cheaper to roll the billet into a rod, draw into wire and produce the wire nail? Pound for pound the wire nail is undoubtedly dearer. While \$1.75 to \$1.85 per keg at mill may represent the cost of steel cut nails on the basis of slabs at \$29 at mill, at which a moderate demand can be supplied by the best located cut-nail mills without a loss, but also without a profit, \$2.40 to \$2.50 is certainly just as dangerously close to the line where losses begin to appear in making standard sizes of wire nails in large plants on the basis of \$29 for wire billets, and which is equivalent to a cost of \$38 for rods. Unless relative costs are changed by greater progress in one or in the other line of manufacture, or unless the fact that the wire-nail manufacturers are to some extent dependent now on foreign sources of raw material tells for or against them at times, then it must rest chiefly with consumers whether or not they find it to their advantage to purchase 100 pounds of wire nails at an increased price, which varies now between 60 and 75 cents per keg. It is over this point that the contest is now raging so far as standard sizes are concerned.

On smaller sizes the question whether or not a manufacturer draws his own wire or rolls his own rods has considerably less significance; and here, too, seems to be the field of the smaller makers, with the advantage in their favor that the differences between wire and cut nails and certain sizes of tacks are not so great. There is a field, too, for specialties which is being well covered.

Messrs. Brettell & Wilson, of 215 and 217 North Water street and 7 River street, Rochester, N. Y., manufacturers of mechanics' tools, inform us that they have arranged with W. A. James & Co., of 273 and 275 Canal street, Chicago, Ill., to act as their Western agents. They shipped to them, last week, two of their planers.

An advance will be made January 9 on westbound rates to the following points over the New York, Lake Erie and Western and Pittsburgh and Lake Erie from Pittsburgh, McKeesport, Beaver Falls and intermediate points. The rate is given in cents per 100 pounds and in the order of classification from first to sixth class: Indianapolis, 39, 36, 26, 19½, 17 and 14; Lansing, Mich., 41, 37, 27, 21, 18, 15; Chicago, 42½, 37½, 27½, 21½, 19, 16; Peoria, 48½, 43, 31½, 25, 22, 19; Evansville, 51, 45, 33, 26, 23, 20; East St. Louis, 53½, 47, 34½, 26, 23, 20; Cairo, 59½, 52½, 38½, 31, 27, 23. These classes are all governed by the official classifications and the rates take effect on Monday, January 9, 1888.

Hosford & Fischer, of Cincinnati, successors to A. Pluemer & Co., pig iron merchants, have issued a handsome calendar.

The Smith Gas Furnace at the Britton Plate Mill.

We give below tests of the Smith gas furnace, made recently at the plate mill of the Britton Iron and Steel Company, Cleveland, Ohio:

First Week.

Actual coal used per short ton 171 pounds.
Coal per double turn, short ton 251 pounds.

Second Week.

Actual coal used per short ton 219 pounds.
Coal per double turn, short ton 311 pounds.

Average of Two Weeks' Run.

Actual coal used per short ton 195 pounds.
Coal per double turn, short ton 281 pounds.

First Week in December.

	Number of heats.	Weight charged.	Hoppers of coal.
Monday 12	One iron, 7,560; four steel, 33,504.	41,064	at 70 pounds.
Night, 12-13	Furnace not working.		26
Tuesday, 13	One iron, 7,740; three steel, 25,860.	33,600	40
(Trouble on rolls.)			
Night, 13-14	Furnace not working.		22
Wednesday, 14	Two iron, 15,390; three steel, 26,022.	41,410	46
Night, 14-15	Furnace not working.		19
Thursday, 15	One iron, 7,580; four steel, 32,695.	40,275	51
Night, 15-16	Furnace not working.		17
Friday, 16	Two iron, 14,430; three steel, 22,980.	37,410	50
Night, 16-17	Furnace not working.		13
Saturday, 17	Two iron, 13,335; one reheater, 1,360; two steel, 16,217.	30,812	41
Shortage on stock.			
Night, 17-18	Furnace not running.		Sun. 18 31
Total		224,571	276, or 128, or 19,320 8,960 pou'ds. pou'ds.

Second Week in December.

	Number of heats.	Weight charged.	Hoppers of coal.
Monday, 19	No work.		18
Night, 19-20	No work.		22
Tuesday, 20	Two iron, 12,630; three steel, 22,920.	35,540	65
Night, 20-21	Furnace not working.		18
Wednesday, 21	Two iron, 11,575; three steel, 20,920; four reheaters, 5,180.	37,675	63
Night, 21-22	No work.		19
Thursday, 22	One iron, 6,200; four steel, 33,965.	40,165	58
Night, 22-23	No work.		19
Friday, 23	Two iron, 14,840; three steel, 26,415.	41,255	53
Night, 23-24	No work.		21
Saturday, 24	Two iron, 15,990; Onesteel, 8,195.	24,185	42
Shut down at Eleven o'clock a.m.			
Total		178,820	281, or 117, or 19,670 8,190 pou'ds. pou'ds.

It should be stated the cause of the increased consumption of the second week was the fact that slack coal was used.

Mr. A. M. Dreves, connected with the firm of Carnegie Brothers & Co., Limited, at Pittsburgh, has removed to St. Louis,

to assume the position of Southwestern traveling agent for that firm. Upon the eve of his departure from Pittsburgh Mr. Dreves was tendered a banquet at the Hotel Duquesne, in the latter city, which was attended by a number of his friends, and a most enjoyable time was had by those present.

WASHINGTON NEWS.

(From Our Own Correspondent.)

WASHINGTON, D. C., January 3, 1888.

The Christmas and New Year's recess of Congress having practically ended, the law-makers of the nation will now come together and settle down to their duties in earnest. The committees will be announced without further delay. The Ways and Means Committee, which is absorbing the larger share of public attention, as it most directly affects the great industrial interests of the people, is still to have the presence of Mr. Mills, of Texas, as its chairman. As that gentleman has agreed to have no opinions except in conformity with the views and wishes of the Speaker, it is not believed that he will stand much in the way of whatever compromise measure may be proposed and approved by Mr. Carlisle.

There have been no direct overtures as yet to give Mr. Randall and his friends the naming of one of their number on the committee. A story was started about Mr. Gay, of Louisiana, being their choice, but that has been emphatically denied by Mr. Randall. If the Speaker really intends to place a protection Democrat on the committee he might as well save himself the trouble if not done with the assent of the persons whose views he is to represent. The Speaker has had enough hints in that direction and if not heeded he might as well pack the committee, as before, and see all efforts to pass a bill vanish.

The Speaker has been unusually reticent about the Ways and Means, as it is liable to changes up to the last moment. The friends of the President are in earnest in having a committee which will accept the situation and do something. The main difficulty with Colonel Morrison was that if he could not have his own particular bill he would have nothing. This was his trouble with Mr. Hewitt, who understood the question, but who could not get a show even after Morrison's bills were voted down. There is no doubt whatever that Speaker Carlisle is making every effort to bring the revenue reduction problem to a solution, and if he does not succeed it will not be his fault.

The Republicans are contemplating a *coup d'état*. They have divers propositions, the latest of which is internal revenue tax repeal on tobacco, a slight reduction on whisky and a repeal of the duties on sugar. This they think will come up very close to \$100,000,000 reduction. There is much talk on both sides of indulging in a little caucusing in hopes of reaching some ground of agreement.

The President's side of the question is not without a large and influential support. He has received letters from the West which show the development of considerable sentiment in his behalf. Although there is considerable local protection sentiment in different parts of the South, it is not likely to affect the results of this year's elections unless the free trade movements should go beyond anything likely to materialize under present conditions. A sufficient protection strength in the Democratic ranks to prevent inimical legislation would be treated in the South as sufficient guarantee for continued support. The only signs of serious weakening are in Virginia.

The tariff battle will be fought in the West. It is from such States as Michigan,

Wisconsin, Minnesota, Iowa, Nebraska and even Illinois that the signs of weakening on the protective system are beginning to crop out. Those States might be affected this year and might have an influence upon the national elections. The scheme of the conservative Democrats in Congress is to frame a measure which will stimulate this sentiment. The Randall idea on that subject is to formulate a bill repealing internal taxes which will not hurt home industries and to make enough reduction in customs, where it can be made without injury to labor, to satisfy Western and New England notions. The metal schedule will be very carefully treated. It is evident, however, that a determined and winning fight will be made for an increased duty on tin plate and cotton ties.

A great deal of unnecessary excitement has been created by exaggerated accounts of defective material used in the cruiser Charleston. It was explained to-day at the steel inspection office that the steel turned out at San Francisco and in Eastern establishments continues to maintain its high average, and that the trouble mentioned was not necessarily owing to defective material. It appears that the deck beams at the ends, which are fastened to the outer frame or ribs of the ship, are slit and part bent down, forming a sort of brace. At the ends a vertical piece is welded on so as to connect the straight and the bent ends. The bending is one of the severest tests which could be given, and the flaw is more likely to occur from overheating than from any fault in the standard of the material. In the construction of the ship, so far, only two such troubles have been experienced. The talk about weakening the vessel is pronounced unwarranted by the reports of the Government representative and by the officers of the Bureau of Construction and Steel Inspection. The alleged defective beams were made in Pittsburgh by the Carnegies.

The condition of work on the new cruisers and gunboats is very satisfactory except in the case of the gunboat building at Baltimore. The delay there is no fault of the builders, but the difficulty of the parties in having their orders for material filled.

According to an account just published in a Moscow paper the Ural iron industry is showing signs of improvement at present, chiefly owing to the opening up of the iron districts by the Ekaterinburg Railway. This passes the principal district of all—the Goroblagodat—which for a century and a half has yielded without intermission a large supply of Ural iron of every description. In the Goroblagodat district there are six iron works, belonging to the Shuvaloff, Stroganoff and other aristocratic Russian families. Upward of 5000 workmen are employed in them all the year round, and the output consists of 30,000 tons of pig iron and 7000 tons of the manufactured article. Sheet iron for roofing is a specialty of the district. A large proportion of the pig iron is used in the Government dockyards and arsenals.

Mr. J. A. L. Waddell, of Kansas City, Mo., a very well-known author on bridge designing and construction, has just published a valuable pamphlet on general specifications of highway bridges of iron and steel. Mr. Waddell introduces the main body of his work by a few chapters in which he tells some forcible truths concerning the present methods of letting bridges and serious defects of some of the work now done, supplemented by remarks bearing on the point how bridges should be built. Mr. Waddell urges the formation of an association to insure a fair profit to the builders, and to guarantee to the public reliable structures.

MANUFACTURING.

Iron and Steel.

Haselton Furnace, of the Andrews Bros. Company, at Haselton, Mahoning County, Ohio, has recently been thoroughly repaired and relined, and will be blown in during the present month. It is estimated that the improvements and changes which have been made to the furnace will increase its output to about 150 tons a day.

The new plant of the Duquesne Tube Company, at Duquesne, about 20 miles from Pittsburgh, was put in operation on Friday, the 30th ult.

It is stated on good authority that a company has just been organized at Wheeling, W. Va., to erect a wagon and carriage axle factory. It is stated that the new company is composed of some of the most enterprising citizens of the above city, and that the new enterprise will soon have substantial shape.

The Laclede Plate and Sheet Mill Company, of St. Louis, have been incorporated, with a capital stock of \$50,000. The above organization have secured a lease of the Laclede Rolling Mills in that city from the Chouteau, Harrison & Valle Iron Company. The new company will manufacture plate and sheet iron, but will drop the manufacture of bar iron. The following is a list of the principal stockholders: Gaius and C. K. Paddock, of the Paddock-Hawley Iron Company, Pauly Jail Building and Manufacturing Company, Bannantine Galvanizing Company, Garstang Boiler Shops, Rohan Bros. Boiler Mfg. Company, N. O. Nelson, Nathan Frank, attorney; George Platt, Mesker Bros., James Diggett & Sons, W. G. Lewis, former superintendent of the Laclede; E. S. Sellers, and others, all of St. Louis.

From the *Ohio Valley Manufacturer* of the 30th ult. we take the following regarding the various industries at Wheeling and vicinity: "Sweeney & Son shipped this week a bell and mouth-piece to the Iron-dale furnace, at Independence, W. Va. The Etna Iron and Steel works are off for a few days, but the office force are busily engaged in taking stock. The Riverside Pipe Works are enabled to make better time on the night turn than by day, on account of the better flow of gas. The Joseph Bell Stove Works are closed this week to make necessary repairs and put in a new hoisting engine, and to perfect several new designs in their patterns. Business at the Wheeling Pottery has been more than usually good during the holiday season. They will close next week to take stock and make some needed repairs. The Standard is well stocked with orders, and is working up to its full capacity, except a few days off for Christmas. It has not known so strong a demand in its line for this season of the year in a long time. The LaBelle is troubled no more for the want of gas. They did not close down this week as they expected, but are running full in order to fill some heavy Western orders before the advance is made on freight that will occur January 1. At the Belmont the furnace has been running very satisfactorily, and has been making A No. 1 iron since blown in. The nail factory is not running this week, but will resume next Monday. They have quit gas altogether and come back to coal. The furnace at the Top Mill is off this week, but the nail department is running full. They are making some good shipments of muck iron to Pittsburgh this week. A shortage of gas compelled them to take off one battery of boilers. The Belmont Glass Works are shut down, and will remain closed until the labor trouble is settled, this being one of the factories affected by the threatened strike. The status of the trouble

remains unchanged, but an early adjustment of the matter is both possible and probable. The freight rates between Wheeling and Chicago have been raised from 15 to 19 cents, and, it is said, will be elevated another notch after January 1. This is a severe blow to the manufacturers of this district, and will operate to almost, if not quite, shut them out of the Western markets.

There have been erected in West Virginia, during the year 1887, the following manufacturing concerns: One car works, 2 cotton and woolen mills, 2 blast furnaces, 4 glass works, 34 mines and quarries, 2 pipe works, 5 potteries, 11 railroads, 2 steel plants and 20 wood-working establishments.

The trouble at the Solar Iron Works of William Clark's Son & Co., at Pittsburgh, over the "two job," which was mentioned in these columns some time ago, has not yet been settled. The works are idle at present, undergoing extensive repairs, but the firm state that they will employ non-union men when they are ready to commence operations if their men do not consent to return to work.

The Pennsylvania Tube Works, at Pittsburgh, were damaged by fire to the extent of \$5000 on the morning of the 30th ult. The fire will not interfere in any way with the running of the works.

On the 1st inst. Carnegie, Phipps & Co. succeeded Carnegie Brothers & Co. as proprietors of the Union Iron Mills, on Thirty-third street, Pittsburgh. The former company now control the Homestead Steel Works, at Homestead, Pa., the Twenty-ninth Street Iron Works, the Lucy Furnaces and the Union Iron Mills, all in Pittsburgh.

The Steelton (Pa.) *Reporter* of the 24th ult. contains the following in reference to the Pennsylvania Steel Works at that place: "An experimental mill will be erected in the near future. The mill will be built on the same site as the new billet mill. The castings made from open-hearth steel will likely be made in the new building. Work on the new billet mill is progressing satisfactorily, and it will be ready to start early in the new year. Additional machinery will be added to the rail mill as soon as time can be spared to close the mill."

A blast furnace is talked of at Rockford, Ill. The Alameda-Rockford Iron Mining Company, of that city, own iron ore mines in Iowa which they are desirous of developing and they may determine to bring the ore to Rockford to smelt it.

R. I. Powell, treasurer of the Columbia Rolling Mill Company, whose office is 132 Nassau street, New York, announces a dividend of 3 per cent. Transfer books will be closed till January 6th.

The Eagle Iron Works, Roland P. O., Centre County, Pa., Curtiss & Co., inform us that they have during 1887 made and sold not less than 1800 tons of cold blast blooms and bars for fire-box flange iron.

In our issue of December 22, in referring to the recent changes in the *personnel* of the Youngstown Rolling Mill Company, we printed the name of the treasurer as John H. Wells. This was a mistake, the vice-president and treasurer being Mr. Thomas H. Wells.

In answer to a report that the Hartman Steel Company, Limited, of Beaver Falls, Pa., had returned to the use of coal as fuel in a portion of their works, we received the following communication from the company on the matter: "The report is wholly incorrect. We are not using coal in any portion of our works. It is possible, however, that we may be compelled to use some coal, owing to the fact that we are at the extreme end of the gas

lines, which are very much overloaded this winter, because of the enormous increase of home consumption in this valley. It will be only a temporary expedient, if compelled to resort to this measure, or until a larger pipe can be laid to the Ohio River."

The Otis Iron and Steel Company, of Cleveland, Ohio, are building two open-hearth furnaces on the general principles advocated by Frederick Siemens.

The blast-furnace property on Annsville Creek, Peekskill, N. Y., including the narrow gauge railroad leading from the furnace to the Croft Mine in Putnam County, was sold at Referee's sale by Franklin Couch, Referee, and was purchased by Lawrence Farrell, of New York, representing Frederick Livingston and W. D. Schoonmaker, of New York, and Joseph Cunningham, of Paterson, N. J., who represented Senator Jones, of Nevada. The price paid was \$33,600.

Machinery.

The Westchester (Pa.) Machine Shops, owned by the First National Bank of Westchester, were entirely destroyed by fire 30th ult. There was a large quantity of finished work in the shop. Loss, \$18,000 or \$20,000.

H. K. Porter & Co., of Pittsburgh, builders of light locomotives, have suspended about one-third of their men on account of a lack of orders. The men will be given their positions again as soon as trade brightens up.

The Allegheny Electric Light Company, of Allegheny City, Pa., have just completed machinery that increases their lighting capacity to 13,500 lamps. They recently added 2500 lamps to the plant, and are now running 11,000, which is something of an increase over the 150 which they had one year ago last March. At a meeting of the stockholders of the company held last week a dividend of 3 per cent. was declared.

The Farrell Foundry and Machine Company, of Ansonia, Conn., are erecting a large factory, which, when completed, will nearly double their present capacity.

A dispatch from West Chester, Pa., dated the 30th ult., says: "The West Chester machine shops were destroyed by an incendiary fire this morning. Loss, \$18,000 to \$20,000; insurance, \$12,000."

The Union Switch and Signal Company, of Pittsburgh, have just received a \$10,000 contract for interlocking switches on the New York Elevated Railroad. This makes \$250,000 worth of contracts furnished for that company.

The Kirby Sewing Machine Company have been organized at Little Rock, Ark. The officers are as follows: S. B. Kirby, president; J. G. Leigh, vice president; J. P. Goodson, secretary; Isaac Wolf, treasurer, and George H. Saunders, attorney.

The Heine Safety Boiler Company have just shipped a 300 horse-power boiler, weighing 25,000 pounds, to the Chicago Edison Station, Chicago, where it will be placed on the second floor of the central station building, along with three other Heine boilers of similar capacity. In making the delivery of this boiler to the Union Depot, in this city, where it was placed in car, considerable trouble was experienced. The only wagon to be had for hauling it to the railroad was the one used by the street railways for the delivery of their cables; the weight of the boiler was far too great for other heavy wagons about town. When the depot had been finally reached the cable wagon stuck in the mud and the switch-engine had to be employed to pull it out. Recent sales of the company embrace a 300 horse-power

engine to the Columbus (Ohio) Electric Light Company—to supplement a Heine engine of 150 horse-power, sold a year ago—and two boilers of 200 horse-power each to the Dallas (Tex.) Woolen and Cotton Mills.—*Age of Steel, St. Louis.*

The Atlas Iron and Brass Works have succeeded to the business of Lind & Carlson, whose foundry and machine shops are located at Kaukauna, Wis., and they have also purchased the patterns and entire outfit of O. E. Merrill & Co., manufacturers of paper machinery at Beloit, Wis., consolidating the whole business at Kaukauna, where they enjoy superior water-power privileges. They have enlarged the iron foundry, built a new brass foundry and blacksmith shop, and have just completed a large machine shop. They will make a specialty of paper-mill machinery and railroad castings, but are prepared to build saw-mill and other machinery. H. A. Fromback is president, H. Kuchmsted secretary, and G. Lind manager and treasurer.

The Hill Clutch Works, of Cleveland, Ohio, report a very satisfactory business for the year 1887, with a very encouraging outlook for 1888. The success of their clutches has been remarkable, the number turned out for each quarter having been 50 per cent. greater than during the preceding quarter. They have furnished the complete equipment of power transmission machinery for a number of very large plants during the year, and have turned out some very large clutch work, notably the two B clutch coupling, 6 feet in diameter, capable of transmitting 1500 horse-power at 100 tons, and which are perhaps the largest friction clutches ever made.

The offices of the Pulsometer Steam Pump Company, H. W. Johnson, president, and G. F. Badger, secretary, have been removed to 120 Liberty street, New York. Numerous recent sales of their pump are reported, testifying to its already established prosperity.

We understand from the Jeffrey Mfg. Company, of Columbus, Ohio, that their sales for chain belting, elevating and conveying machinery in 1887 were much greater than any previous year.

The Wainwright Mfg. Company, of Boston, report the following sales of their feed-water heaters during the month of December: Five in Boston, and one each in Lowell, Brockton, Woburn, Lynn and Southborough, Mass.; Portland and Yarmouthville, Me.; Franklin, N. H.; New York City; Newark, N. J.; Pittsburgh, Pa.; Salem, Ohio; Chillicothe, Mo. and Louisville, Ky. Their corrugated tube expansion joints having recently been shipped to Ware, Norwood and Fall River, Mass; Providence, R. I.; Dunkirk, Cohoes and New York City, N. Y.; Leavenworth, Kan., and Atlanta, Ga. The company report extensive contracts on hand for the new year.

The Union Bridge Company, Athens, Pa., have ordered of the Clayton Air Compressor Works, 43 Dey street, New York, one of the Clayton Duplex air compressors, equipped with the patent air pressure governor and all the latest improvements.

Hardware.

The Essex Horse Nail Company, Essex, N. Y., have recently put in additional machines. They advise us that they have not stopped their works for a day during the past two years, Sundays and holidays excepted. There has been a growing demand for their goods.

The Cortland Door and Window Screen Company, Cortland, N. Y., have been incorporated with a capital stock of \$25,000. They will make and sell door and window

screens. The following are the trustees: Harvey H. Greenman, Theodore H. Wickwin, Fitz Boynton, James F. Maybury, William J. Greenman, Ernest M. Halbur, Edward Keator and William J. Hallenbeck.

The Desplaines Mfg. Company have been incorporated at Joliet, Ill., with an authorized capital of \$40,000, to make nails, wire, &c. The incorporators are W. H. Clark, C. S. Babcock and J. H. Glades. A license to incorporate has also been issued to the Fretress Barbed Wire Company, of East Dubuque, Ill.; capital stock, \$30,000; to manufacture barbed wire; incorporators, Richard E. Odell, John Clinger, A. M. Odell.

A new incorporation is the Flexible Wire Mat Company, of Cincinnati, Ohio, the incorporators being G. H. Burroughs, president; T. F. George, secretary and treasurer; W. C. Knoblaue, vice-president; J. L. Metcalf and John Stuver. The company are having the old shop of the Favorite Carriage Works, on Eighth and Depot streets, remodeled and fitted up with the necessary machinery for manufacturing flexible wire mats, and will have the same in operation by March 1, 1888. In the interval the goods will be manufactured for them under contract. The dimensions of the factory building are 40 x 100 feet, three stories in height.

The Gooch Freezer Company, Cincinnati, Ohio, issue a new circular for 1888 illustrating their Peerless and Giant freezers. The company refer to their sales as already being considerably in excess of those up to this time last year, the demand having been exceptionally large for the goods.

Wood, Smith & Co., Fort Plain, N. Y., in sending out a New Year's greeting to the trade, state that during the past year they have increased and improved their facilities for manufacturing to such an extent that they are practically unlimited. In their axle department they have capacity for 500 sets of axles, and in their spring department for 5 tons of springs each day of ten hours. With the additions and improvements made they state that they are not only prepared to furnish goods greatly improved in quality and finish, but during the busy months they will be in position to take good care of their customers. They allude also to the low prices at which the goods will always be sold.

Miscellaneous.

It is stated that during the present year the Pennsylvania Railroad Company will build 109 locomotives and 3500 freight cars for use on the various lines leased by the company.

A press dispatch from Massillon, Ohio, dated December 30, says: "President John McBride, of the Ohio Miners' Association, has issued a call for a State convention of miners, to be held at Columbus January 17. The topics for consideration are: The joint agreement between the Executive Boards of National District Assembly 135, Knights of Labor, and of the National Federation of Miners and Mine Laborers; the scale of prices and conditions for the incoming year; the establishment of a proper defense fund for State purposes; legislative matters affecting proposed amendments to the semi-monthly pay and break-through laws; election of officers."

A dispatch from Grapeville, Pa., dated December 28, says: "The report which has been circulated concerning the purchase of 400 acres between Radebaugh and this place by the Pennsylvania Railroad Company, for the purpose of erecting immense shops on the site, is incorrect. The company only purchased something over 100 acres. No shops will be erected,

but a scales for the purpose of weighing Western coke will be, as soon as the new road is completed."

A dispatch from Findlay, Ohio, dated the 29th ult., says: "A gas well was drilled in this afternoon at the corner of Park avenue and Sixth street, which, when shot, developed into a producer of tremendous volume, flowing at the rate of 8,000,000 cubic feet per day, which makes it the second strongest well in the city, being excelled only by the famous Karg. Another well on the Karnahan addition was drilled in yesterday, which is now flowing at the rate of 4,000,000 cubic feet per day."

On Friday, December 23, at the works of the United Coal and Coke Company, United, Pa., a hoist of 527 wagons of coal was made in eight hours and twenty minutes. This is an average of 1.65 wagons per minute, or 100 wagons per hour. It is claimed that this is the biggest hoist ever made in the Connellsville coke region in the same length of time.

The report of the Board of Assessors of new buildings erected during the year in Pittsburgh has been completed. The report shows that there were 1974 new buildings erected in 1887, an increase of 595 over the previous year. The approximate value of the new buildings is \$3,250,000, about \$362,000 more than that of those erected during 1886. Eighty-five of these buildings cost over \$10,000 each, some of them ranging as high as \$250,000.

The Fitzmorris & Smith Foundry Facings Supply Company, Cincinnati, Ohio, state that, after a period of experimenting extending over 12 months past they have at last succeeded in producing a mixture for making cores that supersedes anything they have ever met with in this line. It is guaranteed to prevent all "blowing," and obviates the use of flour and other mixtures, and is cheaper. The new compound will be offered to the trade in 300 pound lots, packed in barrels, under the title Standard Core Compound.

A fire at the Lost Creek mine of the Lehigh Valley Coal Company destroyed three pumps and two powerful hoisting engines; loss \$50,000.

On the 26th ult. the factory of the Oval Wood Dish Company, at Mancelona, Mich., was destroyed by fire, involving a loss of about \$38,000. This is the second time the works have been burned this year. On the next day after the fire a meeting of citizens was held, at which \$6000 was subscribed to induce the company to rebuild at Mancelona. The insurance on the burned factory was \$22,000.

A correspondent from Findlay, Ohio, referring to a newspaper account which has recently appeared with reference to a reaction in real estate and in business affairs in Findlay, writes us that real estate in Findlay is steady and selling well. There has been, in the estimation of our correspondent, no indication as yet of reaction. He states, further, that 2400 new houses have been built during the past year, and that according to present indications there will be as many as twice this number built during the coming year. Findlay's boom, according to our correspondent, is steadily on the increase.

During the week ending December 26 the Calumet and Hecla Stamp Mill produced 330 tons, bringing the output of the month up to 1296 tons. This is equal to about 1,950,000 pounds fine copper.

Simeon Jones, ex-member of Parliament, has been commissioned by the Dominion Government to visit South America and the West Indies to work up closer trade relations with Canada.

The Enterprise Lawn Mower.

The Enterprise Mfg. Company of Pennsylvania, Philadelphia, Pa., are about to place on the market a new lawn mower for the excellence of which they make high claims, alluding to the advantages it possesses in lightness, simplicity of con-



The Enterprise Lawn Mower.

struction, ease of adjustment, and durability. This mower is represented in the accompanying illustration. The handle, it will be observed, is made of wrought-iron pipe, and is referred to by the company as an excellent substitute for the old style wood handle. The gears are well guarded, being cov-

Walker. The sash-fastener, Fig. 1, is attached, it will be observed, to the top rail of the lower window sash in the right-hand corner. It has a lever by means of which the rubber roller is operated, and is to be so placed that the rubber roller will press against the center of each side piece of upper sash when the lever is placed in line with the top rail, as shown in the cut. The pressure on the sash thus locks it in any desired position. It will be seen that there is a regulating screw on the outer edge of the base plate, by moving which the pressure can be increased or diminished as desired. This sash-fastener is referred to as having the especial merit of combining in one the qualities of a stop, lock and anti-rattler, and the point is made that by its use the sash can be raised or lowered, or both, and securely fastened as desired, while at the same time by its compression of the sash in the frame it prevents it from rattling. Its applicability on houses and factories where no sash weights are used is also referred to. It will be seen that a similar principle is applied in the door-stop shown in Fig. 2. This door-stop is attached to the bottom of the door as shown in the cut, and when not in service swings freely without contact with the floor. It is worked as indicated by either of two levers which are operated by the foot. By bearing down firmly with the foot on the lower lever the roller brake is applied and the door securely held where desired, while by pushing the upper lever back until it strikes the stop on the base plate, the brake is taken off, the roller being raised from contact with the floor, permitting the door to swing as usual. These door-stops are made right and left hand to suit the direction

doors of higher swing. These articles are both made in malleable iron, japanned, and in brass, polished.

Adjustable Rope Halter.

The accompanying illustration represents an Adjustable Rope Halter which is being put on the market by the Covert Manufacturing Company, West Troy, N. Y. The



Adjustable Rope Halter.

point is made in regard to it that it can be quickly and easily adjusted to fit the smallest colt or largest horse, and that when once adjusted it remains firm and immovable until a change is required, when its construction permits it to be quickly and easily made. The manufacturers refer to the fact that it contains no weak points and is not liable in any way to be broken or disarranged, while at the same time it cannot kink or get twisted, as being composed of but one piece of rope.

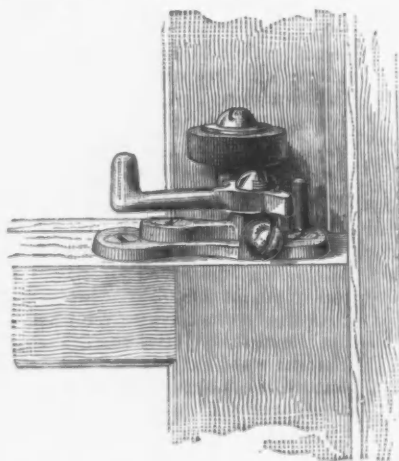


Fig. 1.—Walker's Patent Sash Fastener.

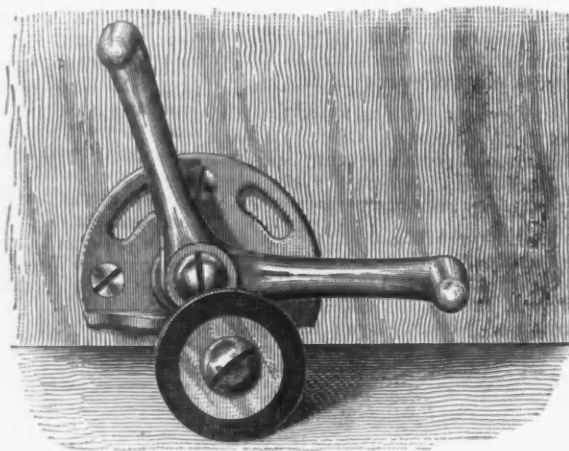


Fig. 2.—Walker's Patent Door Stop.

ered by two flanges and thus protected from the mud or dirt, wear being thus in good measure obviated. The ease of adjustment is especially referred to, as the mower can cut grass from $\frac{1}{4}$ to 2 inches long by merely adjusting thumb-screws on each side of the cross-bar near the roller wheels. The lower cross-bar or dead-knife can be adjusted by means of two set-screws on the side blades which are readily seen. The diameter of the driving-wheels is 7 inches. The company will make a complete line, including 10, 12, 15, 16 and 18 inches. The weights of the 10, 12 and 15 inch machines are respectively 29, 31 and 33 pounds.

New Sash Locks and Door Checks.

H. Walker & Co., 104 East Fourteenth street, Wilmington, Del., are putting on the market the sash-fastener and door-stop represented in the accompanying illustration, Fig. 1 showing the sash-fastener and Fig. 2 the door-stop. These articles are made under patents obtained by H.

in which the door opens. This door-stop is referred to as not only stopping the door at any desired point, but effectually holding it there against violent pressure, while it will also serve as a secure bolt when the door is closed. It is referred to as specially applicable to hotels and boarding-houses, where ventilation is often sacrificed to privacy, while it has advantages as permitting ventilation with security from intrusion, as a door can be fastened partially open. Both door-stop and sash-fastener are obviously easily ap-

plied. The ordinary pattern of the door-stop is designed for doors which do not swing higher than 1 inch from the level of the floor, while a special pattern is used for

Moore's Concave Nail Set.

The Moore & Barnes Mfg. Company, 103 Chambers street, New York, and



Moore's Concave Nail Set.

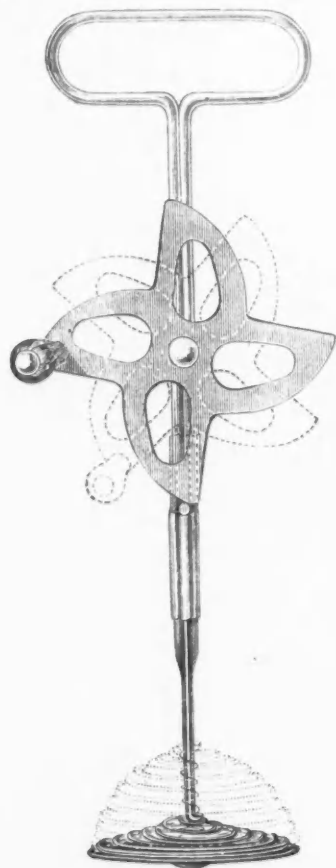
Phoenix, New York, are putting on the market the concave nail set, represented in the illustration given above. The special feature of this nail set is indicated in its

point is made in regard to it that it can be quickly and easily adjusted to fit the smallest colt or largest horse, and that when once adjusted it remains firm and immovable until a change is required, when its construction permits it to be quickly and easily made. The manufacturers refer to the fact that it contains no weak points and is not liable in any way to be broken or disarranged, while at the same time it cannot kink or get twisted, as being composed of but one piece of rope.

name, it having a concave end, a construction which is referred to as preventing the set from slipping off the head of the nail. The fact that it is not liable to become dulled like the pointed is also referred to. The nail set is described as made from the best tool steel, finely tempered and drawn to a blue finish. It is made in four sizes, which are assorted in each dozen.

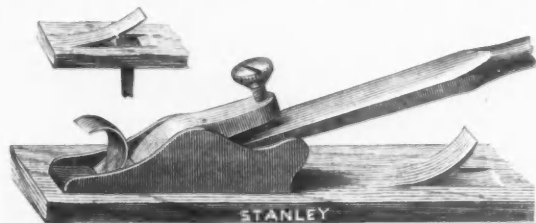
The Cam Beater.

The illustration given below represents a new egg beater which is being introduced by Paine, Diehl & Co., Philadelphia. It is named from the method of its operation, the cam beater. It will be seen that it is



The Cam Beater.

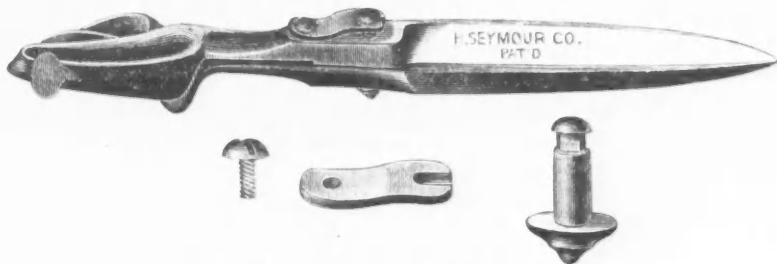
made like the Paine, Diehl & Co. Beater, except that in place of the driving wheel a succession of cams is used to drive the dasher up and down, this operation being indicated in the illustration. The manufacturers advise us that these beaters are made in the best manner, and allude especially to the low price at which they are sold, their object being to place on the market an egg beater of superior efficiency at a low figure. The beater is referred to as having the principal advantages possessed by their Paine, Diehl & Co.'s beater, especially in the fact that it works satis-



Adjustable Chisel Gauge.

factorily in beating a small quantity of egg, or on a flat plate or dish, the point being made that the revolving beaters require eggs enough to cover the dasher before effective work can be done, while these beaters, having a double coiled dasher

beating up and down, work effectively with a larger or smaller quantity of egg without regard to the shape of the dish. They also call attention to the fact that the cutting edges of these beaters are over five times those of other beaters. The

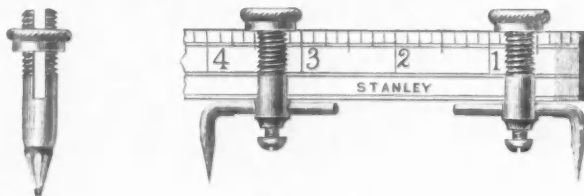


Adjusting Lever Spring and Bolt Tailor Shears.

manufacturers thus put this beater on the market with confidence that it will be found to meet the requirements of the trade for a lower priced beater doing effective work.

Rule Trammel Points.

It is often the case that some simple device attached to a tool which is made for carpenters' use will give a new field of usefulness to it; at the same time it greatly facilitates the employment of the tool in special directions. The Stanley Rule and Level Company, of 29 Chambers street, New York, and New Britain, Conn., are introducing a device that suggests these remarks. It is known as Stanley's Rule Trammel Points. It is illustrated in the engraving below. The trammel head is so constructed that it may be readily applied to a common folding rule of any ordinary width. Two of the heads have adjustable steel points, and may be used to describe circles or to draw parallel lines, in place of common dividers or regular trammel points. The third head which is supplied in the set holds a pencil, and is useful in cases where a steel point is not



Rule Trammel Points.

required. The cut so clearly shows the character and method of the use of these points that further description is scarcely necessary.

Adjustable Chisel Gauge.

The Stanley Rule and Level Company, of 29 Chambers street, New York, and New Britain, Conn., among other new things are putting upon the market an adjustable

any ordinary 1-inch chisel, as here illustrated. With the beveled edge of the chisel up and the gauge secured at the proper distance from the cutting edge, the point is made that a shaving can be turned accurately and so uniformly that when it is

A New Tailor Shears.

The Henry Seymour Cutlery Company, 84 and 86 Chambers street, New York, are putting on the market an improved tailor shears, which is represented in the accompanying illustration, and which is designated as the Adjusting Lever Spring and Bolt Tailor Shears. Its special feature is thus indicated in its name and shown in the engraving, which represents the form of the bolt and the spring by means of which the blades of the shears are tightened or loosened. It will be seen that from the form of this adjusting spring or lever, one end of which is connected with the bolt in the manner indicated, the blades are forced together as the adjusting screw is tightened, the spring serving as a lever, which is worked by this adjusting screw. By this simple contrivance the shears can be made to run tight or loose at the will of the operator, while at the same time they can easily be taken apart for cleaning or sharpening. The other advantages men-

tioned as possessed by this attachment are that there are no more loose bolts; that the shears will not require sharpening as often as the old style, and that no pressure is required on the handles to keep the edges together. In connection with the circular describing these goods a number of testimonials are given from practical cutters, in which emphatic testimony is borne to the utility of this attachment.

An industrial training school has been inaugurated in Paterson, New Jersey, as the result of a popular movement, and a sufficient amount has been subscribed to insure its permanency. Leading manufacturers formulated a plan for an industrial association, but the management will be chiefly under the direction of the Board of Education. Provision has been made for the employment of 30 boys in wood-working, taken from every grammar grade in the city and the High School. Attendance by the pupils of the latter will be compulsory; with the former optional.

Messrs. Rogers, Brown & Co., pig iron merchants, of Cincinnati, have issued an 1888 calendar, similar in appearance to those of former years.

Annual Review of the Metal Market for 1887.

Copper.

The year opened in the New York market at 11½¢ @ 12¢. Lake, and 10½¢ @ 12¢. Baltimore, and in London Chili Bars at £38.10/, against £41 the previous year, and Best Selected at £43. While here activity was held in check by the negotiations going on between manufacturers and the Calumet and Hecla about a new periodical sale, a good business was done in London with a hardening tendency, Chili Bars closing the month at £38.17/6, and Best Selected at £43. 10/. It finally transpired that the company named had sold the manufacturers' pool 10,000,000 lb at 11¢, to cover their requirements for February and March, whereupon the open market gave way to 11½¢, at which it closed. During the first eleven months of 1886 the export of Ingot Copper from the United States had been 17,427,798 lb, against 34,527,975 during the corresponding period of 1885. The visible supply in England and France on January 1 was 63,290 tons, against 58,179 the previous year. The import of American Copper into Liverpool and South Wales during 1886 had been 13,027 tons, against 24,007 in 1885; Chili shipped in 1886 37,017 tons Fine, against 40,947 in 1885. Germany produced in 1886 20,021 tons Fine, against 20,628 in 1885.

In spite of the war apprehensions on the Continent, the London market maintained its liveliness in February, while our own market, on the contrary, was flat and featureless, opening the month at 11½¢ and closing at 10½¢. Chili Bars wound up in London at £39. 10/, and Best Selected at £44. The export of Ingot Copper from the United States in 1886 had been 19,504,087 lb, against 36,221,931 in 1885, the decrease thus being 16,717,844. The visible supply in England and France on February 1 was 61,375 tons, against 58,589 in 1886. The January import of American Copper into Liverpool and Swansea was 66 tons Fine, against 1351 in 1886 and 2364 in 1885.

In March there was an impression in this market that there had been some overtrading in December, January and February, and that the slackening in the demand noticed was due to a more than ample supply in the hands of dealers; the price consequently further declined to 10½¢, which was the closing figure, business being moreover somewhat hampered by the confusion in freights while the Interstate Commerce bill was pending. Meanwhile, some large sales of Montana Matte were made to English smelters. Opening at £39. 7/6, Chili Bars closed in London at £39. 12/6, Best Selected not varying from £44. 10/. The export of Ingot Copper from the United States during the first seven months of the fiscal year proved to have been 12,300,717 lb, against 18,871,080 in 1886. The import of American Copper into Liverpool and Swansea during the first two months was shown to have been 232 tons fine, against 2087 in 1886 and 3328 in 1885. Mr. C. Kirchhoff, Jr., Agent United States Geological Survey, issued at the time a circular showing American production. On reducing those figures to gross tons and comparing the same with the Chilian output on the one hand and the Iberian on the other, the following result is arrived at:

	United States.	Spain and Chili.	Portugal.
1870.....	23,000	49,318	35,361
1880.....	27,000	42,916	36,313
1881.....	32,000	37,989	39,258
1882.....	40,467	42,909	39,560
1883.....	51,574	41,099	44,607
1884.....	63,555	41,648	46,515
1885.....	74,053	38,500	47,873
1886.....	69,809	35,025	49,653
Totals.....	381,467	329,304	337,140

while the general yield has been as follows:

World's Copper Production.

	In gross tons—		
	1886.	1885.	1884.
Europe.....	76,463	76,551	75,410
North America.....	73,780	77,706	66,750
South America.....	40,988	44,573	48,269
Africa, Asia and Australia.....	25,825	27,100	29,360
Totals.....	216,156	225,930	219,789

Since the beginning of the year consumption had made good headway in Europe, so that April opened with an improved statistical position in England and

Copper into Liverpool and Swansea from January 1 to April 16, 664 tons Fine, against 3715 in 1886. Toward the close of the month it transpired that the Calumet and Hecla Company had sold some 32,000,000 lb at 10¢ to some larger consumers, delivery up to December 1, other consumers not being anxious to take their share; furthermore, 2500 tons for export at the same figure. The Quincy Company also sold 500 tons at a similar rate. Baltimore was quoted 9½¢, casting brands being worth 9¢.

In May Lake Copper was offered as low as 9.95¢, the bid obtained being 9.90¢.

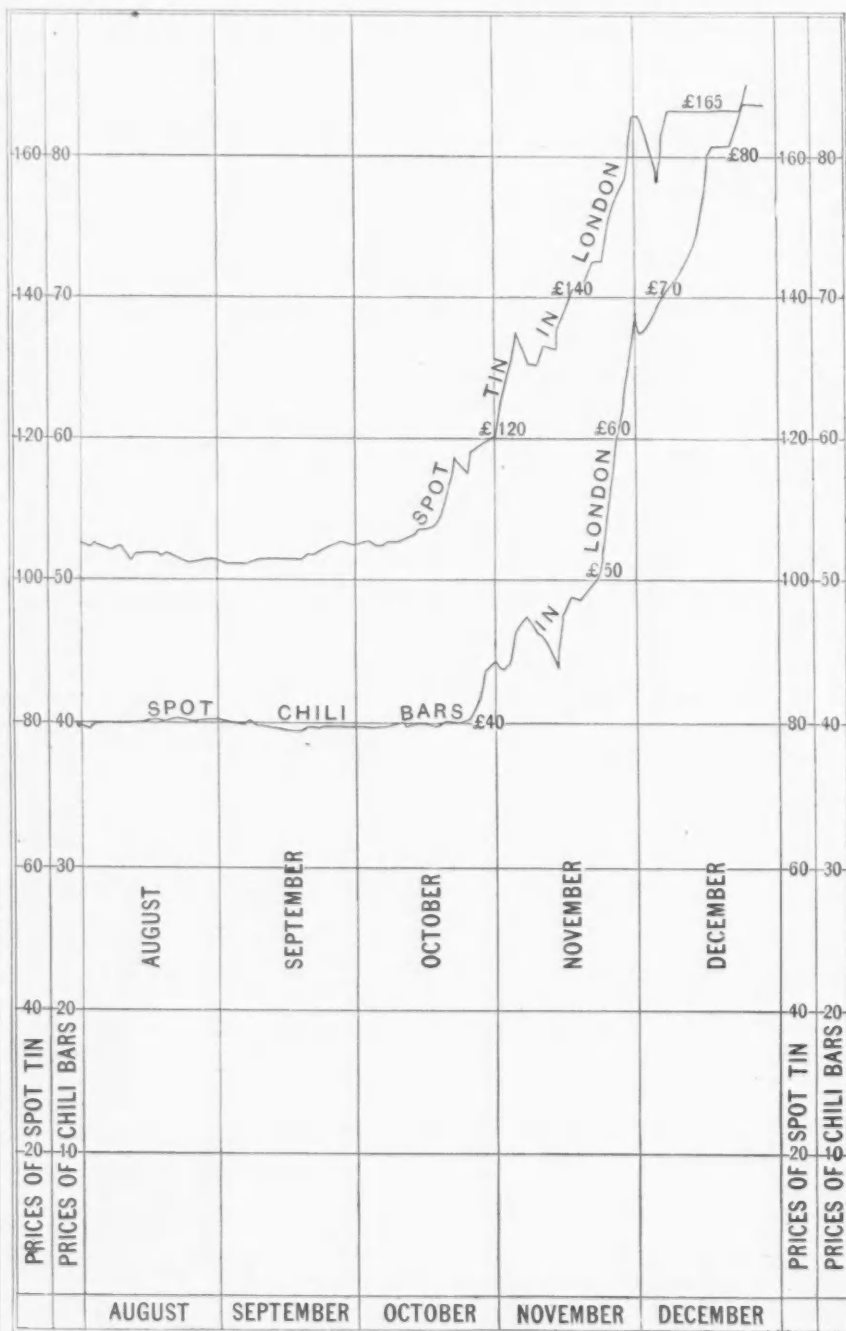


Diagram of Fluctuations of Prices of Tin and Copper in London.

France, where the visible supply had been reduced to 57,023 tons, as compared with 58,499 in April, 1886. In London a fair amount of business was done with but slight fluctuations, Chili Bars closing the month at £39. 5/ and Best Selected at £44. 15/. The decline in silver stimulated the resumption of free shipments from Chili in the meantime. Our own market was dull and weak, carrying the price down to 10.20¢. Domestic exportation during the first eight months of the fiscal year proved to have been 12,481,549 lb of Ingot Copper, against 19,975,928 in 1886, and the import of American

but as the month advanced a better feeling obtained, finally allowing the price to recover to 10¢. The fact is that both Fine Copper and Western Matte had been shipped to Europe quite freely during the month; of Baltimore, also, some 500 tons were shipped. Simultaneously it appeared, on the other hand, that the Calumet and Hecla Company had increased their capacity by six stamps, raising the same, prospectively, to 70,000,000 lb. The cost of production of several Lake Superior companies for 1886 was given as follows: Quincy, 6.78¢ @ lb; Osceola, 8.67¢; Franklin, 9.34¢; Atlantic, 9.52¢, and

Tamarack, 7.49¢, including cost of smelting, freight to and charges in New York. The percentage of Copper in the rock treated and total production during 1886 were as follows: Quincy, 2.54 %; production, 2967 gross tons; Osceola, 1.29 and 1780, respectively; Franklin, 1.88 and 2132; Atlantic, 0.71 and 1752; Tamarack, 2.74 and 1832; Calumet and Hecla, production, 25,259. From this it appeared that the leading mines, with a production of about 35,700 tons, can live at about 10¢ per lb, equaling £47. 10/ per ton, with 2½ % discount; while three mines—the Quincy, Tamarack and Calumet and Hecla—with a production of about 30,000 tons, can do so at 7½¢ per lb, equaling £35. 12/6. That £39. 5/ for Chili Bars and £44 for Best

United States during the first nine months of the fiscal year had been 12,949,758 lb, against 21,149,524 in 1886. Chili shipped during the first four months, 11,380 tons Fine, against 15,541 in 1886; at the same time the import of American into Liverpool and Swansea was 1112 tons Fine, against 4460 in 1886 and 7231 in 1885. On May 1 the visible supply in England and France was 56,172 tons, against 61,069 in 1886 and 55,384 in 1885. Rio Tinto produced, in 1886, 23,500 tons of Fine Copper. On May 6 2250 tons of Anaconda Matte were sold at Liverpool to the associated smelters at 7/9 per unit, and 80 tons on May 29 at 8/. Some 1750 tons of Boleo, Lower California, Bars and Matte were awaiting shipment in that part of

erpool and Swansea from January 1 to May 16 was 1789 tons, against 5364 in 1886. The visible supply in England and France on June 1 was 54,770 tons, against 60,485 in 1885 and 46,430 in 1884. The import into Liverpool and Swansea during the first five months had been of American Copper 2963 tons Fine, against 6217 in 1886. For a couple of days about the middle of June Copper was a little duller, when the break in coffee and wheat occurred, calculated to depress speculation, but the feeling of hesitation soon disappeared.

In July, indeed, Copper in this market attracted the attention even of outside speculators and capitalists in Wall street, and a strong speculative current began to set in, in connection with which the Metal Exchange rapidly rose in prominence and usefulness, thus entering, so to say, upon a new career, much to the convenience of the trade and speculative element at home and abroad. Opening at 10½¢, spot, our market gradually improved to 10¾¢, at which it closed, whereas London gave way from £40 July 1, to £39. 18/9, after touching £40. 5/ on the 22d. Our market was £5 above London. Early in July the Orford Company, producing about 8,000,000 lb of Copper annually, suspended temporarily; on the other hand, the Arizona Copper Company, idle for some years, and capable of turning out 5,000,000 lb Fine, were stated to be on the point of resuming. The consolidation of the Mountain View properties with those of the Montana Copper Company, the Colusa and adjoining claims transpiring at the time was considered a strong and most powerful combination, especially in connection with the Tamarack and Osceola on Lake Superior. It was claimed that the new management could make cheaper Copper than the Anaconda, whose Ores average 7 % Copper, while the Mountain View and Colusa Ores average 14 %. The production of the seven leading Lake mines for the first half of the year was given as 15,110 gross tons, against 15,174 in 1886, and 13,416 in 1885. On July 19, 2100 tons of Anaconda Matte were sold at Liverpool at 7/10 per unit and 150 at 8/. The import of American Copper into Liverpool and Swansea during the first six months was 4661 tons Fine, against 7383 in 1886 and 13,271 in 1885. The export of Domestic Ingot Copper from the United States during the first 11 months of the fiscal year was 17,240,296 lb, against 22,863,696 in 1886.

On August 4 a fire broke out on the sixteenth level in the main shaft of the Calumet and Hecla Mine, which is 3000 feet deep and divided into 34 levels 90 feet apart, and the mine proper was sealed, together with the one separating it from the Black Hills Mine, the second property of the company, whose rock carries only 3 % of copper, while the former carries 4. 5 in the part closed down. The Black Hills Mines produce 1,500,000 to 1,700,000 lb out of the total yield of 4,000,000 lb of copper averaged by the company monthly. Strange to say, with all the speculative disposition which there was at the time in the New York market, this piece of intelligence, important as it was, failed to have much of an effect. The only explanation to be found was that the ruling of low prices during such a long time left behind a demoralization too deep and general to be easily cast off. At the same time the main shaft of the Quincy Company's mill broke, disabling the same for three weeks. The production up to this accident was 1200 tons. American consumers bought in all August some 1,250,000 lb Lake Copper at 10½¢ @ 11¢, while London opened the month at £40. 5/ and terminated it at £40. 3/9; Best Selected improved to £45. 5/ at the close. The sales at Liverpool of Anaconda Matte during the month aggregated 6850 tons, about one-third to arrive, at 8/ per unit. The Anaconda Company made a contract with the Baltimore Copper Works to deliver

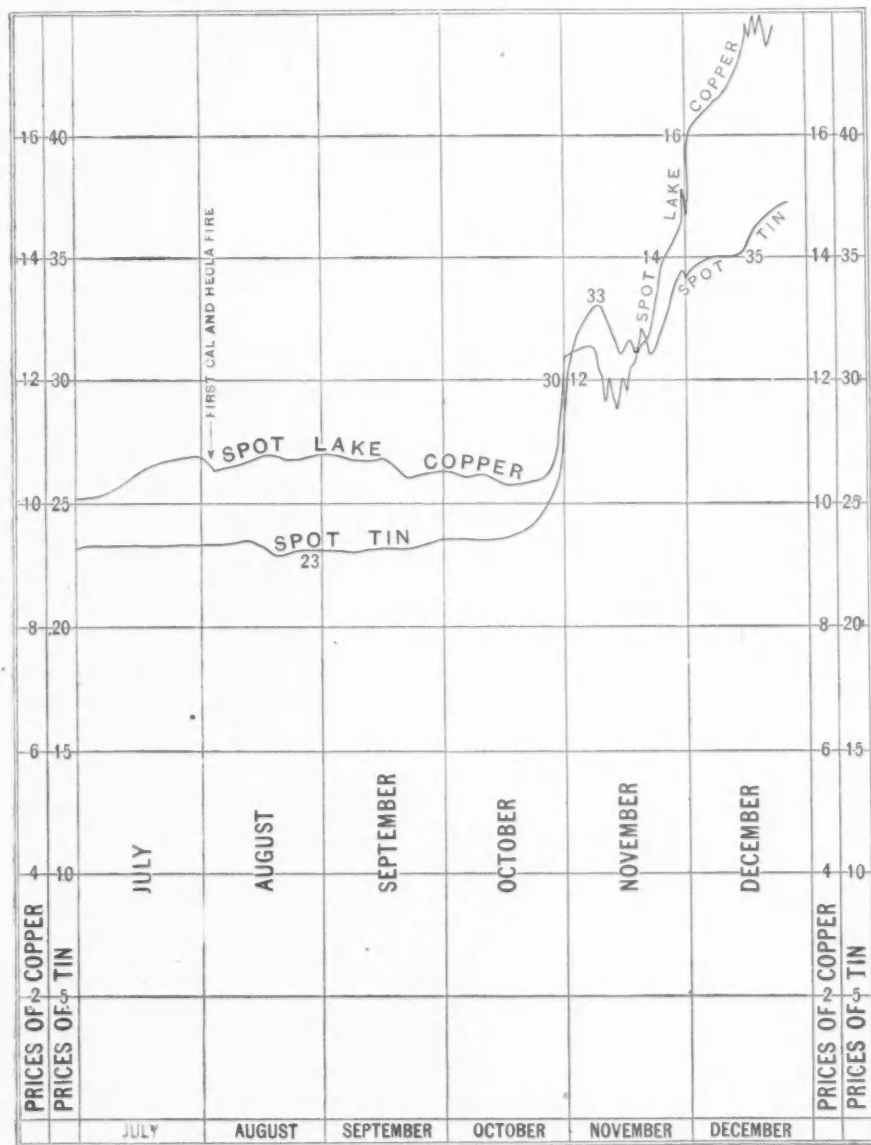


Diagram of Fluctuations in Spot Copper and Lead in New York.

Selected leaves little profit to the large Spanish mining companies is shown by the dividends declared: Mason & Barry, of 2½ % for 1886, against 3½ % in 1885, 8 % in 1884 and 12½ % in 1883; the Rio Tinto Company, of 3 % for 1886, against 5½ % in 1885, 8 % in 1884 and 14 % in 1883; Tharsis Company, of 7½ % for 1886, against 10 % in 1885, 20 % in 1884 and 27½ % in 1883, Chili Bars being £40. 10/ for 1886, £44 in 1885, £54. 10/ in 1884 and £63. 5/ in 1883, while the Panulcillo Company, of Chili, which smelted 2193 tons of Fine Copper in 1886, paid no dividend. A small dividend was, however, declared by the Mansfeld Company, of Germany, for 1886. In London May opened at £39. 5/ and closed at £39. 7/6. Best Selected, which had dropped to £44, recovered to £44. 10/. The export of Ingot Copper from the

Mexico to England, the monthly production being 75 tons Fine. There were rumors of large Copper discoveries in Alaska. The agricultural population in the neighborhood of Rio Tinto, at Huelva, began petitioning the Spanish Government to stop the excessive burning in the open air of sulphur ore by the company at their mines.

In June, in view of the improved statistical position, both in Europe and America, a decidedly better feeling commenced to prevail on both sides of the Atlantic, and a brisker spot and future demand set in in this market, which remained steady throughout the month at 10½¢, and 9¼¢ Baltimore. London opened the month at £39. 5/ and closed it at £40. 2/6, while Best Selected rose from £44. 10/ to £45. 5/. The import of American Copper into Liv-

them Matte for the next five years at the rate of 2,000,000 lb of Copper per month, and not to have refined elsewhere in the United States. The import of American Copper into Liverpool and Swansea the first seven months was 6010 tons Fine, against 9236 in 1886 and 14,553 in 1885. The export of Ingot Copper from the United States during the last fiscal year was 19,580,923 lb, against 24,239,258 in 1886.

In September it was announced that the fire in the Calumet and Hecla Mine had been extinguished, but that the noxious gases had not yet been expelled. Our market receded from 11¢ @ 10½¢, casting brands meanwhile being scarce at 9¼¢. London opened at £40. 3/9 and closed at £39. 15/. It was reported that a considerable business had been done for India, £46. 15/ @ £46. 17/6 per ton being paid for Sheets, and some 500 tons Chili Bars were taken for that country, a novel feature, the Bars being taken, it seems, in default of Australian. The seven chief lake mines produced during the first eight months 21,984 tons of 2000 lb, against 23,095 in 1886. The production of the Calumet and Hecla, fell off for the month of August 1162 tons Fine. In July, August and September 5575 tons of Anaconda Matte arrived in England. The import of American Copper into Liverpool and Swansea during the first eight months had been 7512 tons Fine, against 11,040 in 1886 and 16,440 in 1885. Chilean shipments meanwhile were 20,572 tons Fine, against 28,078 and 30,404. Imports into England and France, 54,427 tons Fine, against 67,643 and 74,012. This falling off was well calculated to attract attention.

In October it gradually leaked out that a syndicate of French bankers, and at the head of them the Comptoir d'Escompte, at Paris, had joined with the Société Industrielle des Métaux, of which M. Secrétan is the president, for the purpose of cornering Chili Bars by buying the stock on hand of them in England. They were said to be the same French parties who had so successfully operated in coffee, and who quite recently, since April last, had been engaged in getting the control of Tin. This Copper speculation of theirs went hand in hand with a huge operation in Rio Tinto and Mason & Barry Copper shares. The Rio Tinto shares were worth 25½ francs in 1883; in 1881, 21½; in 1885, 13½; in 1886, 13½, and on October 4 they were selling at 7½, Mason & Barry shares declining meanwhile from 25½ in 1883 to 5½ on October 4, 1887. The idea of operating in Copper and Copper shares—both unreasonably depressed—was a tempting one. It was so all the more as the Tin corner prepared since April had commenced to give good results, as the coffee corner had culminated in June, and the European stock exchanges had for months been excessively dull, thus predisposing capitalists and operators in favor of any plausible adventure in a solid merchandise like Copper, better adapted than anything else for holding it without involving great expense or risk. At the same time the syndicate killed two birds with one stone, Copper carrying along Copper shares. Brilliantly conceived and eminently well timed as the thing was, it deserved success, and, backed by a heavy array of capital and credit, in this age of the telegraph, quickening action and effect at all important points simultaneously, results were obtained wholly unprecedented, so that the metal trade on both shores of the Atlantic stood aghast. What followed was positively without example in the history of the metal trade. The advance in Copper at the time when the Spanish squadron bombarded Valparaiso was nothing compared to it. The course of the metal till the close of the year was by bounds, and so it was in Rio Tinto, &c., shares. London rose in October from £39. 13/9 to £44. 5/, New York following suit feebly at first, but soon catching the

spirit of the hour and improving from 10¼¢ to 12.30¢. Best Selected advanced in a fortnight from £45. 5/ to £46. The import of American Copper into Liverpool and Swansea during the first nine months was 8937 tons Fine, against 12,032 in 1886 and 18,742 in 1885, and the export of Ingots from this country during the first eight months was 9,019,516 lb, against 11,033,829 in 1886. The production on Lake Superior the first nine months in short tons was 24,570 tons, against 26,249 and 22,648. Since January 1 the stocks in England and France had decreased on November 1 from 54,847 tons to 41,847. The average price of Chili Bars for the first half of 1887 was £39. 10/. Anaconda Matte advanced to 9/ per unit. A large business was done in England in Manufactured Copper for India, and in Tough and Selected at full prices, the improvement in freights stimulating ship-building. Mason & Barry cleared a profit of about £5. 5/ on their make January 1 to July 1, and Rio Tinto of about £4.

In November London rose from £44. 5/ to £68 with Chili Bars, while during the last week of the month Best Selected improved from £58 to £68. 10/. Our own market advanced during the month from 12.30¢ to 15½¢. On November 20 fire broke out again in the Calumet and Hecla mine. In London altogether 40,000 tons Chili Bars changed hands during the month. Some 1300 tons Montana Matte were sold in New York for direct shipment to the Continent during the next six months. It was shown that during the past six calendar years Chilean Copper exportation had fallen off 16% as compared with the previous six years; it was 280,720 tons from 1875 to 1880, and only 235,549 from 1881 to 1886, a difference of 45,171 tons. On October 15 the import of Chilean Copper into Swansea and Liverpool alone was 5733 tons less than in 1886.

The month of December witnessed a rise in Chili Bars in London from £68. 10/ to £85. 2/6 on December 29, closing the month and year at £85. The rise in New York was from 15½¢ to 17¼¢, closing at 17¢. News about the fire in the Calumet and Hecla mine gradually became more reassuring, the occasional slight caves apparently not being of consequence. The total turnover in Copper at the metal exchange in this city in December reached something like 13,000,000 lb; for the year it amounted to 43,500,000 lb. During the first 10 months the export of Ingot Copper from the United States amounted to 10,552,893 lb, against 14,966,107 in 1886. Middle of December, the advance in value of the three Spanish Copper companies' shares in the London market since the upward movement therein commenced was estimated at something like £9,000,000. Meanwhile the Spanish Government resolved to put a stop to open-air roasting at Huelva. The import till then of American Copper into Liverpool and Swansea since January 1 was 15,561 tons Fine, against 12,985 same time during the previous year. Best Selected closed in London at £87. New York closed on the Metal Exchange, on the whole, dull and weak, some misgivings being felt about early deliveries meeting with a smooth liquidation. A telegram from Paris, under date of January 1, says: "Speculation in Copper mining shares has ceased and buyers are realizing. Rio Tinto fell 45 francs during the week, making a drop of 95 francs from the highest price attained."

(To be continued.)

The Amalgamated Association has presented its new steel scale, the mills working under that scale being Homestead, Jones & Laughlins, Schoenberger & Co., Spang Steel Company, Riverside, Wheeling, Benwood, Bellaire, Mingo Junction and Joliet. The Edgar Thomson mill

operates under the Knights of Labor scale. The Black Diamond, Linden, Smith Brothers, La Belle and Moorhead, McClean & Co. are non-union.

Railway Progress for the Year.

The *Railway Age* publishes its annual report of new mileage, from which we quote the following:

The year 1887 has surpassed all other years in the extent of railway mileage constructed in the United States. When, six months ago, the prediction was made in these columns that the total new mileage for the year "would not be less than 10,000 miles, with the likelihood of surpassing the record of 1882, the year of the greatest railway construction in the history of the country," it was not generally believed, but the figures obtained by careful investigation throughout the year and confirmed by official information now prove the prediction to have been more than warranted. Our returns show that during 1887 no less than 12,724 miles of new main-line track were added to the railway system of the United States, no account being taken in this of the hundreds of miles of side-track built, nor of the thousands of miles of main-line tracks relaid. While the search has been unusually thorough, and the totals corroborate the records kept from week to week, it is not improbable that some scattering additions may yet be received, so that it is safe to state that during 1887 nearly if not quite 13,000 miles of new main-line track were constructed. When in 1882, during a period of extraordinary activity, 11,568 miles of new road were built it was generally believed that these figures would not again be equaled. In the following year, 1883, the new construction fell to 6741 miles, in 1884 to 3825 and in 1885 to 3608 miles. The year 1886 witnessed a considerable revival of activity and 9000 miles of new road were built—a greater mileage than in any previous year with the exceptions of 1881 and 1882—and now 1887 has witnessed the building of more miles of railway than 1886 and 1885 combined, and not much less than 1885, 1884 and 1883 together.

	No. Lines.	Miles.		No. Lines.	Miles.
Maine	2	31	Minnesota	9	196
New Hampshire	1	23	Dakota	17	76
Massachusetts	5	35	Iowa	10	352
New York	6	97	Nebraska	17	1,101
New Jersey	2	15	Wyoming	3	133
Pennsylvania	12	125	Montana	7	616
Maryland	1	18	Kansas	44	2,070
West Virginia	3	53	Missouri	16	554
Virginia	4	64	Indian Territory	5	499
North Carolina	10	184	Arkansas	8	155
South Carolina	7	104	Texas	19	1,050
Georgia	8	231	Colorado	9	818
Florida	10	193	New Mexico	1	4
Alabama	15	513	California	14	358
Mississippi	5	99	Idaho	2	54
Louisiana	4	65	Utah	1	6
Tennessee	10	68	Arizona	2	70
Kentucky	8	168	Oregon	4	48
Ohio	14	155	Washington Territory	3	108
Michigan	13	700			
Indiana	9	106			
Illinois	12	328	Total in 42		
Wisconsin	11	363	Total		362 14,724

We compile from our detailed records the above summary, showing the number of lines and the mileage laid in each State and Territory during the year.

A mass of native copper, the largest found in 10 years, has been uncovered in the Central mine. It is 30 feet long, 17 feet wide and from 3½ to 4 feet thick.

Carnegie Brothers & Co., Limited, of Pittsburgh, have blown out furnace "D" for relining and other repairs and have also temporarily banked "C" and "E." This leaves three furnaces still in blast producing Bessemer pig iron and one running on spiegel.

TRADE REPORT.

British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]
LONDON, WEDNESDAY, January 4, 1888.

There continues to be an active demand for various descriptions of Steel. Those adapted for shipbuilding purposes are still most prominent in this connection, and business has been done this week at a further rise in prices. Works in most sections have increased their output. In the Wales district orders have been refused. Two works that have been idle for several years were started up this week on Steel. Advanced prices are quoted by some makers for Blooms and for Rails. The Rail market is somewhat quieter, however, and, while sustained in a measure by the firmness of other Steel productions prices show unevenness. The Dowlais Iron and Steel Company have taken an order for 20,000 tons at £4. 1/6 for the Central Argentine Railroad.

In the Pig-Iron branch no striking feature has developed. Business has, to a considerable extent, been partially suspended, as customary at this season. Prices remain quite steady on Bessemer descriptions, but are a shade lower on Scotch and Cleveland.

The Tin-Plate market has been quieter, without material change in values. There are evidences of a readjustment of affairs, in keeping with the condition of the crude material market. Messrs. J. Chiners & Son have taken on 800 men and reopened their works (the Gwendraeth Mills) at Kidwelly. Their nine mills are now in operation. The stock at Swansea is now 85,000 boxes, against 149,000 boxes at the corresponding period last year. A movement is on foot to form a combination of makers to regulate prices. There will be a meeting at Swansea on Tuesday to take the matter in hand.

The speculation in metals generally has been on a moderate scale, but prices are still held very firmly all along the line. Copper furnace material is 6d to 1/ higher now than a week or ten days ago. Messrs. James Lewis & Son's circular notes sales of 200 tons Montana Matte (50 %) at 15/ per unit, to arrive. The visible supply of Copper in England and France on the 1st instant was 42,000 tons, against 43,700 tons the middle of last month and 63,000 tons a year ago.

Scotch Pig.—Trade has been rather slow, and prices are a shade weaker on most brands.

No. 1 Coltness, f.o.b. Glasgow.	53/
No. 1 Summerlee, " "	52/
No. 1 Gartsherrie, " "	48.6
No. 1 Langloan, " "	51.6
No. 1 Carnbroe, " "	46.6
No. 1 Shotts, " at Leith.	49.6
No. 1 Giengarnock, " Ardrossan.	49.6
No. 1 Dalmellington, " "	45.6
No. 1 Eglinton, " "	45/

Steamer freights, Glasgow to New York, 7/6; Liverpool to New York, 7/6.

Cleveland Pig.—The market steady at modified prices, with the demand fair. No. 1 Middleboro', G. M. B., 35/6; No. 3 do., 33/, f.o.b.

Bessemer Pig.—Prices hold quite steady, and the demand runs fair. West Coast brands, mixed numbers, 47/, f.o.b.

Spiegeleisen.—The demand fair, and prices very steady. English 20 % quoted at 72/, f.o.b.

Steel Rails.—The demand fair; prices quite firm as a rule. Standard sections, £4. 5/, f.o.b.

Steel Blooms.—Demand moderate, but higher prices asked by some sellers. We quote at 75/ @ 80/, f.o.b., for 7 x 7.

Steel Billets and Slabs.—There has been less doing, but prices are well maintained. Bessemer 2½ x 2½ inch Billets, £4 @ £4. 2/6, and Nail Slabs £4 @ £4. 2/6, f.o.b.

Steel Wire Rods.—The demand moderate, and prices without change. Mild Steel, No. 6, quoted at £5. 17/6 @ £5. 18/9, f.o.b.

Old Rails.—Very firmly held, but demand moderate. Tees quoted at £3 @ £3. 2/6, and Double Heads £3. 2/6 @ £3. 5/, c.i.f. New York.

Scrap Iron.—Demand moderate, but sellers are firmer; Heavy Wrought at 50/ @ 52/6, f.o.b.

Crop Ends.—The market steady, but quiet; Bessemer quoted £2. 7/6 @ £2. 12/6, f.o.b.

Tin Plate.—The market remains firm in tone with demand very fair. We quote, f.o.b. Liverpool:

IC Charcoal, Allaway grade	17/3 @ 17/9
IC Bessemer steel, Coke finish.	15/ @ 15/3
IC Siemens " "	15/3 @ 15/6
IC Coke, B. V. grade	15/3 @ 15/6
Charcoal, Terne, Dean grade	13/9 @ 14/3

Manufactured Iron.—Demand fairly active and prices quite strong. We quote, f.o.b. Liverpool:

Staff. Ord. Marked Bars	£ 7 00 0 @ 7 12 6	s. d.
" Common "	5 00 0 @ 5 2 6	
" Bl'k Sheet, singles	6 15 0 @ 7 00 0	
Welsh Bars (at Wales)	4 12 6 @ 4 15 0	

Tin.—Market firm, but quiet. Straits closed at £166. 10/, spot, and £150, three months' futures.

Copper.—Trading moderate, but prices well maintained. Chili Bars closed at £85; Best Selected, £81.

Lead.—Business slow, market rather weak. Soft Spanish, £15. 10/.

Spelter.—Demand continues good and prices strong; Silesian, ordinary, £20. 10/ @ £21.

Financial.

OFFICE OF THE IRON AGE.
WEDNESDAY EVENING, January 4, 1888.

The new year commences auspiciously, with no reason to doubt that the extraordinary prosperity of the last twelve months will continue, subject only to those temporary perturbations inseparable from the activities of 50,000,000 to 60,000,000 people, the most enterprising and opulent on the globe. A plenty of money, increasing railroad earnings, an unprecedented movement of grain, coal, lumber and other commodities via the Northern lakes and canals, good prices for agricultural products, a steadily decreasing national indebtedness, and, not the least of all, a wide range of mechanical industries profitably employed—all these afford indubitable evidence of a substantial prosperity, limited only by the bounds of the national domain. The old year expired quietly, ruffled only by a disturbance in the Schuylkill coal regions, serious enough in its possibilities as affecting the iron interests, but repudiated by those highest in the councils of organized labor as having no adequate cause. The coal

trade, it is hoped, will soon be adjusted on a satisfactory basis without a protracted struggle, and be resumed with unwonted activity for the mid-winter season. Prices generally are steady. In manufactured goods, such as have copper for a component part, there is a marked advance. The grain markets are stronger on account of purchases in the West and an improved export demand.

The Stock Exchange markets have been irregular, and generally dull and lower. Reading has been depressed by the miners' strike, but not seriously affected. The Vanderbilts declined fractionally on the announcement of smaller dividends than were expected. To-day's business was only a repetition of the dullness preceding. United States bonds closed as follows:

U. S. 4½s, 1891, coupon	107¼ @ 108¼
U. S. 4s, 1907, coupon	125¼ @ 126
U. S. Currency 6s, 1895	119 @ 120
U. S. Currency 6s, 1896	121 @ 122
U. S. Currency 6s, 1897	123 @ 124
U. S. Currency 6s, 1898	125 @ 126
U. S. Currency 6s, 1899	127 @ 128

The total sales of stocks at the New York Stock Exchange during the past year were 85,921,028 shares, against 100,802,050 shares for the year ending December 31, 1886, a decrease of 14,881,022 shares. The sales of State and railroad bonds amounted to \$366,966,253 par value, against \$607,631,911 the previous year, a decrease of \$240,665,658, and Government bonds, \$6,647,100, against \$12,793,500, a decrease of \$6,146,400.

The first business day of the year saw New York Central quoted at 113½; it has paid 4 %, and is now 108½. Lake Shore was quoted at 95½; it is now 95, and has paid 4 %. Michigan Central was quoted at 93½; it is now 87, and has paid 4 %. Canada Southern was quoted at 63½; it is now 56½, and has paid 2½ %.

The money market was firm, prime commercial paper finding ready sale at 5½ @ 6½ %. Interest and dividend payments during the month of January will be unusually heavy. The Government interest, of which \$6,000,000 is payable at New York, amounts to \$9,368,000. The amount of railroad bonds on which interest will be paid is \$1,595,188,160, and the interest thereon to be paid is \$39,038,473. The par value of the railway stocks which will pay dividends is \$739,807,127; the dividends thereon are \$14,985,038. The interest to be paid by leading cities, municipalities, &c., amounts to \$4,000,000, and dividends to be paid on bank stocks in New York, Philadelphia, Boston and Baltimore amount to \$2,000,000. The aggregate, including the Government interest, is about \$70,000,000. Railroad dividends were, in several instances, disappointing, although the annual reports were exceptionally good, the Vanderbilt lines especially manifesting a conservative feeling. The weekly statement shows a loss in reserve of \$477,250. The banks now hold \$8,559,150 in excess of the legal requirements. The changes in the averages show an increase in loans of \$6,130,500, an increase in specie of \$806,500, an increase in legal tenders of \$594,600, an increase in deposits of \$7,513. The exports of specie from this port during the week were \$419,000; total since January 1, 1887, \$18,501,346. The imports of specie amounted to \$275,672; total since January 1, 1887, \$40,577,124.

Some men gifted in prescience profess to see a cloud rising from excessive railroad

building during the year 1887, representing a cash expenditure of not less than \$240,000,000. So enormous an expenditure in one single branch of industry, we are told, could not do otherwise than give an excessive stimulus to general trade, which will as certainly be wanting in the present year. It is reasoned that as the stimulus ceases to operate the feverish activity of trade and the growth of population will experience a corresponding decline. The Western roads have overbuilt themselves in the same manner that the roads east of the Mississippi were plunged as the result of the boom times previous to 1881, and will have to go through a like process of liquidation. The Minneapolis and St. Louis, which now defaults on its bonds, is pointed out as merely the first of a lengthening series. Sterling exchange is easier. Bar silver advanced in London $\frac{1}{4}$ d to $44\frac{1}{4}$ d @ ounce. Although the recent sharp advance in silver bullion was largely speculative, the London *Statist*, in considering the subject, says it was partly due to legitimate causes, principal among which is the strength of the produce markets. The exporters of India, China and other silver-using countries would, in case of receiving higher prices for their products in London, have the means of buying a greater amount of silver, of which they would without doubt take advantage. The Bank of England rate of discount is unchanged. With regard to the financial outlook, Washington correspondents represent that the Secretary of the Treasury is confirmed in his belief that he can under the law purchase bonds at the market price "to any extent which the condition of the Treasury may justify, independent of any reference to the Sinking Fund requirements, and that this provision of law was expressly devised and provided to meet such necessities as now arise, and to remain inoperative indefinitely as a means of relief in such cases."

The latest movements of specie reported by the leading European banks show large losses all round. The Bank of England reports a decrease of \$2,805,000. The Bank of France notes a loss of \$1,335,000 gold and \$115,000 silver. The Bank of England holds at present \$5,452,965 more gold than it held at the end of last year. The proportion of the reserve shows a far more considerable improvement. The Bank of France in the twelvemonth has lost \$25,012,120 gold and gained \$9,951,696 silver, a reduction of \$15,060,424 in the specie line. The Imperial Bank of Germany shows, on the other hand, an increase of \$27,795,000 specie. On the proportions noted above \$14,731,000 of this gain is in gold and \$13,064,000 in silver. The three banks, reckoned together, show for the twelvemonth a loss of \$4,828,155 gold and a gain of \$23,015,696 silver, a net increase of \$18,187,541 specie. Last year they held 58.35 per cent. of their specie in gold, and 41.65 per cent. in silver. At present they show 56.31 per cent. in gold and 43.69 per cent. in silver.

The imports of merchandise in New York last week were valued at \$8,775,222, of which \$2,400,000 represents dry goods. Since January 1, 1887, the total is \$465,259,305, as compared with \$433,239,272 in 1886 and \$389,725,835 in 1885.

The exports for the week were \$6,052,868, making the total since January 1, 1887, \$311,601,172. The items include 211,500 barrels of flour, 147,000 bushels of wheat, 15,000 bales of cotton, and 8,322,000 gallons of petroleum.

The Superintendent of Insurance at Albany says of the insurance business of the

past year that it has been very disastrous. Few, if any, companies will show a surplus, the losses being exceptionally heavy.

The stockholders of the Ninth avenue Bank, it is said, have been called upon to make good \$68,000 of capital stock which the Banking Department claims is impaired by the loans made by Cashier Hubbard, a portion of which is secured by collaterals in the shape of mortgages on real estate.

The Trunk Lines Freight Committee in this city agreed upon the following new rates on steel and iron merchandise between New York and Chicago, which will go into effect on January 9—25¢ @ 100 lb in carloads, and 30¢ @ 100 lb in smaller quantities.

The year's return of failures reported by R. G. Dun & Co., the Mercantile Agency, shows a decrease of 200 in the number for the year, but a large increase of \$53,000,000 in liabilities, as follows:

	Number.	Liabilities.	Average.
1887.....	9634	\$167,560,944	\$17.392
1886.....	9834	114,644,119	11.651

The returns for the Dominion of Canada show 1382 failures, with \$16,311,745 liabilities. The failures in the Dominion were 1 in every 54 persons in business; in the United States they average 1 in every 111 persons.

Coal Market.

The Reading strike, originally confined to the railroad, now extends in full force throughout the Schuylkill regions, and 45,000 men are reported to be idle, including the Lehigh region. A number of individuals, however, are at work on the 8% basis on an agreement to conform to the terms of the final settlement with Reading, whatever it may be. In the Coal trade at large there are fears that the struggle may be prolonged, but there is only a single opinion in regard to the effect on the total Coal supply—namely, that there can be no famine beyond the line of the Reading Railroad. It is reasoned that as the Reading furnished only about 20% of the total the other companies, stimulated by an active demand and good profits, can fill the void. As to the question at issue, the view is commonly taken that either Reading must force wages down to the old \$2.50 basis, for which the Lehigh Navigation Company is contending, or the latter must come up to the 8% advance, which may be questioned after having already suffered more than three months. Moreover, as the Lehigh strike was due to Corbin's 8% concession, the Lehigh Navigation Company not unnaturally solace themselves with the reflection that what is "saucer for the goose" may be good enough for the gander, and so may rest content, for what they lost Corbin made. Prices of Anthracite are only nominal, as quoted a week ago: Free Burning Broken, \$4, f.o.b.; Egg, \$4.25; Stove and Chestnut, \$4.75; Lykens Valley Broken, \$4.90; Egg, \$5.40; Stove, \$5.65; Chestnut, \$5.40, at shipping docks, f.o.b. Reading is taking no orders whatever, and the New York companies only agree to sell Coal afloat, or as they get a supply in hand. No recent contracts are reported, except with the New York Charities and Correction, which was at an advance compared with last year. Mr. F. A. Potts, of the Anthracite Coal Executive Committee, remarked this morning, in substance, that while a prolonged strike is possible, its influence will be limited. The companies generally have put more Coal on the market than ever before and are in a good position, with a fair stock on hand. They will be able to make good the usual January and February supply. As the demand is much lessened by the close of ice-bound ports, an advance in prices does

not necessarily follow. The Bituminous mines are capable of a greatly increased production under a pressure. Bituminous Coal is in good demand, as for some time past, at unchanged prices.

NEW YORK.

American Pig.—The strike of the Reading miners has caused a further postponement of the announcement of opening prices by the Thomas Iron Company, and while both the Lehigh and Schuylkill miners are out it is not likely that contracts will be entered into. The embarrassments growing out of an inadequate full supply experienced by the furnaces along the Lehigh Valley will naturally be made worse by the cessation of work in the Reading collieries, and now the furnaces in the Schuylkill and Lebanon Valleys, too, will be affected, the former making chiefly Foundry and Forge Irons, while a large proportion of the output of the latter is used for Steel manufacture. The first effect may be expected to be the closing down of furnaces running on Bessemer Pig, since the demand for that class of Iron has fallen off, and the majority of the Steel mills have ample stocks of raw material, and are running slow anyhow. This applies particularly to some of the furnaces forming part of the plant of Rail mills in Eastern Pennsylvania. Some of the Nail, Bar and Plate mills having their own furnaces in the districts affected may conclude to close down their rolling mills. Some of the furnaces have been running so close with their fuel supply and in so unsatisfactory a manner that, considering the condition of the markets, they may conclude to blow out if the developments of the next few days are unfavorable. The Hudson River furnaces, and generally speaking those who obtain their fuel by navigation, are well stocked up, and will continue to run in any case. On the whole, the situation seems grave, and, considering the scarcity of good brands of Foundry Iron, the low stock at furnaces and in the hands of consumers, a serious scarcity may result. It is true, on the other hand, that to some extent consumption will be interfered with both in mills and foundries, which are, however, generally speaking, less dependent upon local sources of fuel. Some contracts have been placed by Hudson River furnaces during the week contingent upon later announcement of prices. We hear of sales of a Standard No. 2 Lehigh Iron at \$20.50 at Providence, and are reported further sales of Southern Iron for delivery during the next few months, one firm alone reporting 5000 tons. We continue to quote No. 1 Foundry, \$20.50 @ \$21.50; No. 2, \$19 @ \$19.50, and Gray Forge \$16.50 @ \$16.75.

Scotch Pig.—There is a moderate demand. We quote Coltness \$22 @ \$22.50; Dalmellington, \$20 @ \$20.50; Glengarnock, \$21 @ \$21.50; Summerlee, \$21.50 @ \$22; Clyde, \$20.50 @ \$21, and Eglington, \$19.50 @ \$20.

Blooms, Slabs and Billets.—With the exception of occasional lots for special purposes, we hear of no business in foreign material of this class.

Bar Iron.—The market is quiet, with Common at 1.77½¢ @ 1.85¢, Medium at 1.85¢ @ 1.95¢, and Refined at 1.95¢ @ 2.25¢, according to quality. Good Pittsburgh Bar Irons are selling in round blocks at 2¢ here on dock.

Plates and Sheets.—Importers claim to be doing considerable business in this direction, quoting Steel Bars, 1.90¢ @ 1.95¢; Steel Plates, 2.10¢ @ 2.15¢, and Steel Sheets, 2.20¢ @ 2.25¢.

Steel Rails.—We do not hear of any sales of any consequence, and the market is dull, with very conflicting statements as to quantity of business in sight. As a matter of fact, inquiries are not numerous

now, however much business may follow the placing of the Pennsylvania Railroad order, which is not yet settled. We quote \$31.50 @ \$32.50. We print elsewhere a review of the market for 1887.

Wire Rods.—Business is quiet, with quotations ranging between \$40 @ \$41, according to time of delivery.

Old Rails.—Irresponsible parties have caused an apparent demoralization in the trade, offering Old Rails down to \$20.50 for T's, claiming that they were lots in bankers' hands. We note actual sales aggregating about 1500 tons of Doubles and Bridges, the former at about \$22.25 and the latter at about \$22.75. T's are offered at \$21.50.

Messrs. Naylor & Co., of 99 and 101 John street, announce that their senior partner, Mr. Sebastian B. Schlesinger, has retired from their firm, having disposed of his interest to Messrs. Edward Ascherson and Alexander Sowerby Hay, of London, who join the firm. Messrs. Naylor, Benzou & Co., of London, continue to be their European correspondents.

Metal Market.

Copper.—On Thursday of last week London came 2/6 better, Chili Bars being cabled £85. 2/6, with sales of 450 tons, while in New York there was a moderate amount of trading at lower figures, as follows: 25,000 lb December at 17 1/4¢; 25,000 January at 17 1/4¢; 50,000 February at 17.45¢ @ 17.50¢; 100,000 March at 17 1/4¢; 75,000 April at 17.55¢, and 25,000 May at 16¢. On Friday Chili Bars came £85, with sales of 375 tons, our own market again being lower, with sales of 75,000 lb January at 17.05¢; 100,000 February at 17.35¢ @ 17.40¢; 50,000 March at 17.40¢; 25,000 February, seller's option, at 17.30¢; 25,000 ditto at 17.30¢, and 50,000 lb January, buyer's option, at 17.30¢. Yesterday London remained unaltered at £85 (sales 325 tons) and so it did this morning. Best Selected has not swerved in London from £87. Our market was again weaker yesterday of spot, 75,000 lb selling at 16 1/4¢, and February at 17.10¢ @ 17.25¢. On January 3 it was cabled from Paris that quite a break had taken place in Copper stocks, Rio Tinto having declined some 85 francs below the highest previous point, but there has been a rebound since of 25 francs in Rio Tinto. As for the Calumet and Hecla fire, Mr. Jacob, the New York agent, at his office this forenoon, stated to us that the news from the mine about the fire is about as favorable as it possibly can be. At the Metal Exchange, on first call, 25,000 lb February Lake Copper were sold at 16.80¢; 25,000 lb do. 16.85¢, and 25,000 lb May at 16.60¢; the f.o.b. quotation at the close is 16.75¢ @ 17¢.

Tin.—During the latter half of last week the London market remained unaltered, £167, spot, and £150, three months, but there was an improvement of £1 on Monday in spot Straits, which disappeared again yesterday, since when the quotation remains unaltered, and so is the general position of the metal, which remains exceedingly firm and higher on this side, at 37¢ spot, March selling yesterday at 34 1/4¢, at which 10 tons were taken, and 20 tons April, at 34¢ @ 34.15¢. The visible supply in Europe and America increased from 14,053 tons, December 1, to 16,429, January 1, and was last year, on Jan. 1, 11,808 tons. **Tin Plates.**—The local inquiry has been rather brisker, and there is a good demand for futures, without so far leading to much doing. Liverpool is unchanged, 15/3.

Lead.—At 4.95¢ some 200 tons have been taken for consumption since our last report, the market being quiet and feature-

less. It should be remarked, however, that Western smelters are lightly stocked and decline selling any deliverable at New York for less than 5¢, and then only small parcels of 50 tons. The English market has meanwhile receded 5/, Soft Spanish, to £15. 10/ and English Pig to £15. 15/. The closing quotation at New York is 4.90¢.

Spelter and Zinc.—There has been only a small business done on the spot in Common Domestic Spelter at 5 1/2¢ @ 5.80¢ as to brand, while Silesian remains unaltered at 6 1/2¢, and unchanged in London at £21. The production of Spelter in Silesia during the first nine months of 1887 has been 62,032 tons, against 58,810 during the corresponding period of 1886. The production of Sheet Zinc was respectively 21,959 tons and 18,710. **Sheet Zinc.**—A moderate demand has prevailed at 6 1/2¢ @ 7¢ for Domestic.

Antimony.—Very little has transpired on the spot at 11 1/2¢ @ 12¢ Hallet, and 15 1/2¢ Cookson. The London quotation remains unaltered, £50, for the former.

New York Metal Exchange.

The following sales are reported:

THURSDAY, December 29.	
25,000 lb Copper, December.....	17 1/4¢
25,000 lb Copper, January.....	17 1/4¢
25,000 lb Copper, February.....	17 1/4¢
75,000 lb Copper, April.....	17.55¢
25,000 lb Copper, February.....	17.45¢
100,000 lb Copper, March.....	17.40¢
25,000 lb Copper, May.....	16.90¢
FRIDAY, December 30.	
75,000 lb Copper, January.....	17.05¢
25,000 lb Copper, April.....	17 1/4¢
16 tons Lead, December.....	4.95¢
16 tons Lead, December.....	4.92 1/2¢
100,000 lb Copper, January, Buyer's option	17.30¢
50,000 lb Copper, February, Seller's option	17.30¢
16 tons Lead, December.....	4.92 1/2¢
50,000 lb Copper, February.....	17.35¢
50,000 lb Copper, February.....	17.40¢
50,000 lb Copper, March.....	17.40¢
SATURDAY, December 31.	
100,000 lb Copper, spot.....	16.90¢
100,000 lb Copper, February.....	17.40¢
100,000 lb Copper, March.....	17.50¢
10 tons Tin, March.....	34.25¢
25,000 lb Copper, February.....	17.35¢
WEDNESDAY, January 4.	
25,000 lb Lake Copper, February.....	16.80¢
25,000 lb Lake Copper, February.....	16.85¢
25,000 lb Lake Copper, May.....	16.60¢
50,000 lb Lake Copper, February.....	16.65¢
50,000 lb Lake Copper, February.....	16.75¢
25,000 lb Lake Copper, February.....	16.70¢
100,000 lb Lake Copper, February.....	16.60¢
25,000 lb Lake Copper, March.....	16.70¢
25,000 lb Lake Copper, spot.....	16.25¢
25,000 lb Copper, January.....	16.25¢
50,000 lb Lake Copper, March.....	16.65¢

Philadelphia.

Office of The Iron Age, 220 South Fourth St., PHILADELPHIA, Pa., January 3, 1888.

Pig Iron.—Owing in some measure to the season of the year, and in some degree to other circumstances, very little business has been done or attempted to be done within the past week or two. There is plenty of business in sight, some people think as much as there was a year ago, but how it is to be done, and on what terms it is to be done, seems to be a mystery. Prices cannot be advanced in view of the tariff agitation and the increasing competition on all sides, and they cannot be reduced with cost of production on its present basis, while consumers hesitate to place orders unless they can do so at less money, or get more for their products, neither of which plans seems feasible at the moment. The market is therefore in a condition of suspense, buyers and sellers each waiting for the other to give way, without much probability of either doing so until something more definite appears than at present. The extreme scarcity of good Iron for immediate delivery is a point in holders' favor, and as the demand for small lots is likely to absorb pretty nearly all the Iron that can be made for the next month or two, change in prices is not likely to be of much importance. Mean-

while \$20.50 to \$21 at tide is quoted for standard brands of No. 1 Foundry, \$19 for No. 2 and \$16.75 @ \$17.25 for Gray Forge, with the usual addition of 50¢ to \$1 for special qualities. P. S.—Since writing the above we find quite an active demand for Pig Iron, and several large lots closed at prices said to be rather above what was offered last week. The feeling is feverish, but on the whole firmer, owing to light stocks, continued heavy consumption and fears of curtailment of production on account of the strike.

Foreign Iron.—No demand whatever, the ideas of buyers and sellers being too far apart. High freights and better markets abroad prevent business with this country at present.

Blooms.—Some business has been done, but prices are very irregular, and, on the whole, somewhat lower. Asking prices are about as follows: \$29 @ \$30 for Nail Slabs; \$31.50 @ \$32.50 for 4 x 4 Billets; \$35 @ \$36 for Siemens-Martin. Domestic Blooms as follows: Steel, from \$30 to \$35, f.o.b. cars at mill, according to analysis; Charcoal Blooms, \$53 @ \$54; Run-out Anthracite, \$45 @ \$46; Scrap Blooms, \$38 @ \$39 per "bloom" ton.

Muck Bars.—Nothing doing and prices barely steady, although the best qualities are still firmly held. Sales in small lots at \$30 @ \$30.50 at mill, according to location.

Bar Iron.—There is no business to report as yet, the majority of people waiting to see what turn the market is likely to take. There is a large amount of Iron wanted, and for the present consumption promises to be equal what it was a year ago, but for some reason there is a great deal of backwardness in placing orders. The tendency of prices has been downward for some time, and buyers seem determined to get in at still lower figures before they give out any large amount of business. Manufacturers are anxious to get something to start up with, but it seems very improbable that they will (or can without loss) accept the low prices which are offered, say 1.85¢ to 1.9¢ for large lots of Best Refined Bars. Orders at something near these figures have been accepted by country mills, but there is no reason to suppose that first-class Iron has been sold at less than 1.95¢, and in most cases 2¢ is asked. The market is very unsettled, however, and it is hard to say what the next turn may be, particularly if the strikes in the Coal regions seem like continuing. Skelp Iron is decidedly lower, and although the demand is expected to be large, bids are from 3/6¢ to 4/6¢ lower than they were a year ago. But buyers may be simply feeling the pulse of the market, and if it proves to be firm and steady orders and bids may be of a much more liberal character than they are to-day. This, in fact, seems to be the condition of the market all the way through, buyers and sellers each trying to find out how much strength (or weakness) there is in the market.

Plate and Tank Iron.—There is some inquiry from shipbuilders, and several fair-sized orders have been taken, but on terms not made public as yet, although it is believed that the figures were very low. The 45% tariff on this class of material cuts into the trade seriously, and there is little chance of improvement unless duties can be made specific, instead of as at present, ad valorem. Prices are about as follows, but a little irregular: Ordinary plate, 2.15¢ @ 2.20¢; Tank, 2.20¢ @ 2.25¢; Shell, 2.6¢ @ 2.7¢; Flange, 3.5¢; Fire-Box, 4¢. Steel Plates, Tank, 2.6¢; Shell, 2.8¢; Flange, 3¢ @ 3 1/4¢; Fire-Box, 3 1/4¢ @ 4 1/4¢.

Structural Iron.—There is not a great deal of business doing, although there has been a fair inquiry and one or two rather important transactions. Prospects are

good and expectations of lower prices are not as strong as they were a little while ago. Mills are starting up with a moderate amount of work on hand, and more believed to be not far distant. Prices steady as last quoted—viz.: 2.25¢ @ 2.35¢ for Bridge Plate; 2.3¢ @ 2.35¢ for Angles; 2.8¢ @ 2.9¢ for Tees and 3.3¢ for Beams and Channels.

Sheet Iron.—Business is very quiet, but stocks are low, which, with the current demand for small lots, is likely to keep the mills fully employed in making up an assortment to carry in stock. Prices steady as follows:

Best Refined, Nos. 26, 27 and 28....	3½¢
Best Refined, Nos. 18 to 25	3¼¢
Common, ¼¢ less than the above.	
Best Bloom Sheets, Nos. 26 to 28....	4½¢ @ 4¾¢
Best Bloom Sheets, Nos. 22 to 25....	4¢ @ 4¼¢
Best Bloom Sheets, Nos. 16 to 21....	3½¢ @ 3¾¢
Blue Annealed.....	2.8¢ @ 3¢
Best Bloom, Galvanized, discount.....	.60
Common, discount.....	.65

Steel Rails.—The only sale of importance so far as known is that by the Troy Company to the New York Central at \$34 @ works. There is a good deal of inquiry from the smaller class of buyers, but the large companies still keep their orders in abeyance. The feeling among manufacturers seems to be very firm, however, and if large buyers remain out much longer prices may be stiffened up, as the dull season is getting pretty well over. Meanwhile \$32 to \$33 is quoted rather firmly, and higher figures are not altogether improbable in course of the next 60 or 90 days.

Old Rails.—Nothing doing, and prices are very feverish and irregular. Some holders anticipate an early improvement and are not offering at anything like the rates obtainable to-day, while others have been realizing at such figures as they could get, say \$21 @ \$21.50 for small lots of T's. There are very few offerings to-day, and for such \$22.50 is asked, but there is no demand of any importance.

Scrap Iron.—There is more inquiry for Scrap, and prices are decidedly dearer, say about as follows: Cargo lots No. 1 Scrap, \$21 @ \$21.50; carload lots, \$22 @ \$22.50, or for choice lots \$22.50 @ \$23. No. 2 do., \$14 @ \$15; Turnings, \$15 @ \$16; Old Car-Wheels, \$17.50 @ \$18; Old Steel Rails, \$20 @ \$21; Cast Scrap, \$16 @ \$17; do. Borings, \$11 @ \$12; Old Fish Plates, \$26 @ \$27.

Wrought-Iron Pipe.—Business is quiet, and prices are being strictly adhered to. Discounts are quoted as follows: Butt-Welded Black, 47½%; Butt-Welded Galvanized, 37½%; Lap-Welded Black, 60%; Lap-Welded Galvanized, 45%; Boiler Tubes, 52½%.

Nails.—The demand for Iron Nails is light, and prices are quoted at from \$2.05 to \$2.15, which, to some extent, is being maintained.

W. R. Hart & Co., of Philadelphia, issue a circular in which they say: "We have completed arrangements which will enable us to supply Steel Blooms, Slabs, Billets, &c., of American manufacture, to be made specially for our orders to any desired specification, and of quality which we believe to be equal to anything now made. We are also in a position to quote lowest prices on Foreign Steel, Pig Iron and other material. We shall continue the sale of Castle Pig Iron for finest Steel and high-grade Bessemer Irons of the most desirable makes."

Lindsay, Parvin & Co. have removed their offices to Bullitt Building, on South Fourth street, and have secured excellent accommodations there.

John L. Hogan & Co., No. 216 South Fourth street, Philadelphia, announce their appointment as agents for the Princess Fur-

nace, of Glen Wilton, Va., for Philadelphia and vicinity. The product is mainly high-grade Foundry Iron.

Valentine & Armstrong, No. 226 South Fourth street, Philadelphia, announce the completion of the Bellefonte Furnace Company's furnace, at Bellefonte, Pa., and say that they will be prepared to name prices and make deliveries of Pig Iron after January 15, 1888. The Iron will be made from the Centre County Brown Hematite Ore, with Connellsville Coke as fuel, which is a good guarantee as to quality.

Pittsburgh.

Office of *The Iron Age*, 77 Fourth avenue, }
PITTSBURGH, PA., January 3, 1888. }

It is the opinion of some that the new year does not open up very auspiciously so far as regards the general Iron and Steel trade, and it must be admitted that there are a good many complications to be adjusted; but as soon as matters become more fully settled, as they will before long, there will no doubt be an improvement all along the line, although it may not equal that of a year ago.

Pig Iron.—Dullness continues to be the order of the day, and until the work of stock-taking and making repairs is completed there will not likely be any improvement. However, the market is in this peculiar condition that it is hard to foretell what a day may bring forth. Stocks in hands of consumers are very much reduced, and very slight evidence of a hardening would be sufficient to make many of them at once go on the market, and just as soon as they commence to buy a much stronger market will be the natural and legitimate result. With the exception of Coke, which has been reduced 25¢ per ton, the cost of production remains unchanged, and it is considered on all hands that there is no margin for profit at present prices. Furnacemen who contract for future delivery at present prices must have strong faith in cheaper Ore, labor, &c.; already some of the furnaces have asked for a reduction of 10% in labor, and, having been refused, they have either blown out or banked up. Herein lies the trouble; furnacemen must reduce the cost of production or get more money for their product. This is the actual situation at present, and until there is a radical change one way or the other business is likely to remain much as it has been for some time past. While consumers admit that Pig Iron is low they claim that it is bringing all it is worth when prices of the products are taken into consideration. What is wanted more than anything else is a proper adjustment of values, and this realized, as it will no doubt be before long, trade will soon give evidence of improvement. There has been little or no change in prices during the week. We quote as follows:

Neutral Gray Forge.....	\$16.00 @ \$17.00	4 mos.
All Ore Mill.....	18.00 @ 18.50	"
White and Mottled.....	15.50 @ 16.00	"
No. 1 Foundry.....	19.00 @ 19.50	"
No. 2 Foundry.....	18.00 @ 18.50	"
No. 1 All-Ore Foundry.....	20.00 @ 20.25	"
Charcoal Foundry.....	23.00 @ 26.00	"
Cold Blast Charcoal.....	27.00 @ 30.00	"
Bessemer Iron.....	18.50 @ 19.00	"

The only sale of any importance reported was 1000 tons No. 1 Gray Forge, for January delivery, at \$16.50, cash, and there are but few, if any, sellers for that kind of stock below that price. Bessemer Iron continues very dull, and while we are not advised of sales below \$19, four months, it is intimated that it can be bought at \$18.50.

Muck Bar.—Continues very dull, and it does not look as if there would be any improvement for a week or two to come. Prices remain unchanged at \$29 @ \$29.50, cash. So far as we are advised there have

been no sales below \$29, cash, and some mill owners are refusing to sell below \$29.50.

Manufactured Iron.—The offerings of new business continues light, but it is expected that the demand will begin to show up before the close of the present month. January is nearly always a dull month and the first half of it is usually occupied by mill owners in taking stock and making repairs. However, there is not much doubt that orders will commence to come forward more freely before many weeks elapse, particularly if there should be any evidence of market stiffening. Prices remain about as last quoted: 1.85¢ @ 1.90¢ for Bars; Plate, 2.35¢ @ 2.45¢; No. 24 Sheet, 2.85¢ @ 2.90¢; all 60 days', 2% off for cash.

Nails.—There has been no change in the general position of the market. Recently manufacturers do not look usually for much until toward spring, and it is not likely that there will be any particular activity until the spring trade opens up. Prices are still quoted at \$1.90 @ \$2. 60 days, 2% off for cash. Some Philadelphia parties talk of starting a Wire Nail factory here. There was an agent here a few days ago looking out for a location.

Wrought-Iron Pipe.—There is not much new business offering, nor is it to be expected at this particular time, when trade is usually dull. This month will be pretty fully occupied by manufacturers generally in taking stock and making repairs. The next meeting of the association will take place at Philadelphia, but it is not likely that any change will be made in prices, which we continue to quote as follows: Discounts on Black Butt-Welded Pipe 47½%; on Galvanized do., 37½%; on Black Lap-Welded Pipe, 60%; on Galvanized do., 45%; Boiler Tubes 52½% off; Casing, all sizes, 50% off; 2-inch Tubing 14¢ per foot, net; 2-inch Line Pipe, 13¢; 8-inch Line Pipe \$140.

Old Rails.—There has been little or no business in this market for a couple of months or more; consumers have been buying only as their immediate necessities required. Foreign Tees, in the absence of sales, may be quoted nominally at \$23.50 @ \$24. We understand that negotiations are pending for several lots, and it is probable some sales will be made before the close of the present week.

Steel Rails.—The market here continues quiet, but it is probable that some orders will be booked before long; mills here are quoting at \$33, cash, on cars at mill, for winter or spring delivery, but for a desirable contract the above quotation might be shaded somewhat. A considerably improved demand is looked for next month; possibly there will be an improvement before the close of the present month.

Billets.—Some large sales of Bessemer Steel Billets were made during the week under review, all at \$29, cash, which may be regarded as the market price. Intimations have been thrown out that they could be bought for less, but so far as we can learn there have been no sales under \$29. Nail Slabs are also quotable at \$29, cash. Small sales of Bloom Ends at \$19 @ \$19.25, cash, and Rail Ends at \$19.50 @ \$19.75.

Railway Track Supplies.—There is not much doing, nor is it expected at this season of the year; the outlook, however, is regarded as being favorable for a good spring trade. Prices remain unchanged: Spikes, 2.60¢, 30 days, delivered where the rate of freight does not exceed 15¢ @ 100 lb; Splice Bars, 2¢ @ 2.10¢; Track Bolts, 3¢ with Square and 3.10¢ with Hexagon Nuts.

Old Material.—The demand for everything in this line continues light, as consumers have been buying only as their

immediate necessities required, but there is likely to be an increased demand before long. No. 1 Wrought Scrap may be quoted at \$20, net ton, Wrought Turnings, \$14 @ \$15; Car Axles, \$27 @ \$28; Cast Borings, \$12 @ \$13, gross; Cast Scrap, \$16.75 @ \$17; Old Car-Wheels nominal at \$19.50 @ \$20. There have been no sales of Wheels reported here for some time, and there appears to be no demand for them. There is a very good demand West from Car-Wheel makers, who remelt them, and they are paying more than other consumers are willing to pay.

Window Glass.—There has been an improved demand developed, and the market is firmer; outlook considered favorable for a good spring trade.

Chicago.

Office of *The Iron Age*, 95 and 97 Washington St.,
Chicago, January 2, 1888.

The year which has just ended was one of very great activity in the Chicago Iron trade. The volume of business in the aggregate was far in excess of the achievements of any previous year. In a few branches the competition among manufacturers reduced prices to an unremunerative point, and, toward the close of the year, both the demand for and prices of other important products weakened very perceptibly, but the net result of the year's business was fairly satisfactory to both manufacturers and merchants. On most products the fluctuations in prices were very slight during the whole 12 months, so that business was in a healthy state, free from the feverishness and unsettled feeling accompanying rapid advances and reductions.

Pig Iron.—The importance of the Chicago market is shown by the mere statement that, according to estimates made by parties who are in a position to be thoroughly informed on the subject, over 500,000 tons of Pig Iron were consumed and distributed during the year 1887, not including the consumption by the Steel works in the immediate vicinity, which would add over 700,000 tons to this quantity. The entire trade in Pig Iron would thus aggregate about 1,250,000 tons in this one locality, or over one-sixth of the total consumption of the country. The character of the Pig Iron marketed at Chicago is also more varied than is the case in any other trade center. During the past year Charcoal Iron has been sent to Chicago not only from the Lake Superior district, but from Ohio, Tennessee, Alabama, Missouri and even Connecticut. Coke Iron was sent there from Pennsylvania, Ohio, Indiana, Wisconsin, Virginia, Kentucky, Tennessee, Georgia and Alabama. New York Anthracite and Imported Scotch Pig Iron were also handled to a considerable extent, to say nothing of imported Bessemer Pig Iron and Spiegeleisen. During the year Lake Superior Charcoal Pig Iron did not vary in price more than \$4 per ton on standard grades. These were quoted at \$24 @ \$25 in January and February, \$23.50 @ \$24.50 in March and April, \$23 @ \$23.50 from May to August, \$22.50 @ \$23 in September, \$22 @ \$22.50 in October and November, and \$21 @ \$21.50 in December, all cash prices, f.o.b. Chicago. The prices of other Iron have been regulated very largely by the course of the trade in Lake Superior Charcoal Iron, modified to some extent by the scarcity of Coke Iron during the strike in the Connellsville Coke region in the early part of the summer. For a considerable part of the year also but little was done in the Chicago market in Southern Coke Iron, owing to the fact that the demand from other sections absorbed all the Iron which the Southern furnaces were able to supply. In the last quarter of the year a change occurred in this respect, and Southern

Iron has since been sent to the Northwest more freely. The year closed with a fair business in progress, especially in Lake Superior Charcoal Iron, of which a considerable quantity was sold during the last three days at top prices, indicating a firmer feeling. In Coke iron there was no special activity, but inquiries in hand indicated a good buying movement for this month. The price of Coke has been reduced to \$1.75 @ ton at the ovens, making local furnacemen feel somewhat easier over the situation, but there is little prospect of relief for them in the cost of Ore, as the contracts for Ore which have thus far been made are based on the same price at the mine which ruled a year ago. If lower freight rates can be secured, however, some saving may be effected on the cost laid down at the furnace. Current quotations are as follows, for cash, f.o.b. Chicago: Lake Superior Charcoal, Nos. 1, 2 and 3, \$21 @ \$22; Alabama Car-wheel, \$26; Tennessee Car-wheel, \$23.50; Southern Charcoal Foundry, \$21.50 @ \$22.50; Jackson County Softeners, No. 1, \$21; American Scotch, No. 1, \$20.50 @ \$21.50; Lake Superior Coke, all Ore, No. 1, \$20 @ \$21; No. 2, \$19 @ \$20; Cinder mixed, 50¢ less; Coke Bessemer, run of furnace, \$20 @ \$21; Southern Coke, No. 2, \$19.50 @ \$19.75; No. 2½, \$19.

Bar Iron.—The year opened with a heavy demand from car-builders, and the mills tributary to this market well supplied with orders. Common Bars were quoted at 2.15¢ in carload lots from mill. From that price there was a gradual shrinkage until 1.80¢ was touched for such lots, half extras, with a concession of \$1 @ ton on large orders and choice specifications, which is about the price now ruling, with the market somewhat in buyers' favor. Plenty of business is in sight, however, and a better condition of trade is hoped for this month. Good Muck Bar Iron is quoted at 1.90¢ @ 1.95¢ in carload lots, f.o.b. Chicago, half extras. Store prices are quoted at 2.10¢ @ 2.25¢.

Structural Iron.—A better year was never known in this branch of trade. Prices at the beginning of the year for carload lots were as follows: Angles, 2.6¢; Tees, 3¢; Universal Plates, 2.6¢, all f.o.b. Chicago. Prices held up well during the whole year, having but recently receded to the following figures: Angles, 2.4¢; Tees, 2.8¢; Universal Plates, 2.4¢. The price of Beams and Channels was fixed in February at 3.4¢ in carload lots, f.o.b. Chicago, and the rate has not since been changed.

Plates.—More Iron and Steel Plates were sold in Chicago in 1887 than in any previous year. Prices on ordinary transactions varied but little, Tank selling at 2.60¢ @ 2.65¢ in January and at 2.40¢ @ 2.50¢ in December, in carload lots, f.o.b. Chicago. On large contracts these prices were shaded, but the general market has been very steady.

Sheet Iron.—An unusually heavy demand was experienced for Sheets of all gauges and qualities, Black and Galvanized. The fall trade was especially large. As to prices, Common Black was quoted in January at 3.2¢, in carload lots, f.o.b. Chicago, receding to 3.1¢ by June, but advancing to 3.1¢ at mill in July, partly in consequence of an agreement to maintain prices by the manufacturers. This price was held firmly until December, when concessions were made on advance orders of one to two-tenths. In Galvanized Iron there was no such accord as to prices, and concessions were quite freely made from regular quotations during the whole year, notwithstanding a most excellent demand, until an advance in the price of Spelter in the latter part of November checked the weakness in prices. Manufacturers' quotations throughout the year were 62½¢ off on Juniata, and 62½¢ and 5¢ off on

Charcoal, with 60¢ as the quotation on Juniata to the small trade, and 60 and 5¢ on Charcoal, subject to the influences above referred to.

Merchant Steel.—A very satisfactory year's business is reported for this branch. Two attempts were made to advance prices on Tool and Machinery Steel, one in February, which did not last many weeks, and one in November, which is still maintained. The variations on ordinary transactions during the whole year were but from ¼¢ to ½¢ from present prices, which are as follows: Bessemer Bars, 2.35¢; Tool Steel, 8½¢ @ 9½¢; Specials, 13¢ @ 25¢; Crucible Spring, 4.25¢; Open-Hearth Spring, 3.30¢; Open-Hearth Machinery, 2.75¢ @ 3¢; Crucible Sheet Steel, 7¢ @ 11¢.

Steel Rails.—For eleven months of the year the Rail Mills in this vicinity were pushed to their utmost capacity to meet the demand upon them, and their production in that time was far ahead of anything accomplished in previous years. Orders were not forthcoming from the railroad companies during the later part of the year, however, and two of the mills were obliged to discontinue operations early in December. A third followed later in the month, and the fourth will shortly close from the same cause. Inquiries are now being received for Rails, and it is estimated that over 250,000 tons will be placed by Western roads alone as soon as it is known that leading railroad companies in the East have contracted for their year's requirements. The year opened with \$40 as the ruling quotation at Chicago, advancing to \$43 in February for such orders as could be managed then, and continuing at that rate until June, when \$42 was named, dropping to \$40 in September, to \$38 in October, and to \$36 in November and December.

Old Rails and Wheels.—At the beginning of the year Old Rails were scarce and in demand, and in February they commanded the top price reached, which was \$29. From that time they gradually declined in price from month to month, and are now quoted at \$21, with very little doing. Old Car-Wheels were also in demand when the year opened, sales being reported up to \$23.50 in February. Becoming scarce, their price was well sustained, the lowest reported sale to a consumer being at \$20.50 in December. They are now firmly held at \$21, a sale of 500 tons having been made at that figure within a week.

Scrap Iron.—Consumers were overtaken by the winter of 1886-87 with a small stock of Scrap, and they were consequently obliged to pay high prices for stock to fill orders for Car Axles, &c. In February No. 1 Forge Scrap reached \$28 @ ton; Old Axles, \$30; No. 1 Mill, \$21; Cast Machinery, \$16.50. From these rates there was a gradual decline, under a diminished demand, until in June No. 1 Forge was sold at \$19; Old Axles, \$24.50; No. 1 Mill, \$15.50; Cast Machinery, \$15. In August an advance was established to \$22 for No. 1 Forge, \$26.50 for Car Axles, \$17.50 for No. 1 Mill Iron, and \$15.50 for Cast Machinery. From these quotations there was a gradual decline, until rates rule as follows: No. 1 Forge, \$20 @ \$21; Car Axles, \$25; No. 1 Mill, \$15.50 @ \$16. The demand for Cast Scrap has been unusually good for some months, and the price of that rules very steady, at \$15 @ \$16. These prices are all @ ton of 2000 lb.

Barb Wire.—A flattering prospect was spread before the Barb-Wire manufacturers at the beginning of the year. Although they had not succeeded in forming the pool which has been contemplated for months, and for which many of them were enthusiastically working, they believed that they had effected a better understanding with one another, and, that, in future,

prices would be more closely adhered to. As the year wore on, however, the fair prospect was clouded and the experience of previous years was repeated in 1887. In May Sherman & Marsh and Schnable & Co., failed, although not on account of the Barb-Wire trade. For a time the market was relieved by the restriction of production thus effected, but other influences were at work undermining prices, and before the close of the year the manufacturers found themselves where they were at the darkest period in 1886. A meeting was held at Chicago in December to devise some means of relief, but thus far nothing has developed. Prices are quoted by manufacturers at 3.10¢ for Painted and 3.85¢ for Galvanized in large lots, while jobbers quote 3.20¢ @ 3.25¢ for Painted and 3.95¢ @ 4¢ for Galvanized.

Nails.—The year opened well for the manufacturers of Cut Nails. Carload lots of Steel Nails were quoted at \$2.60 in January, and an advance was made to \$2.75 in February. If these rates could have been sustained, all would have been well, but unfortunately the jobbers had been supplied with large stocks at much lower figures, and they took possession of the trade. Speculators also had loaded up with low-priced Nails, and they were ready to unload at the first indication of weakness. In March shading began, and soon an open cut of 15¢ @ 20¢ was made, resulting in sales of carload lots in April at \$2.50, when the Western Nail Association took a heroic step and cut the card at one stroke to \$2.25, making the carload rate in Chicago \$2.32½, against which the jobbers made a price of \$2.40. From these rates there was a gradual fall until October, when manufacturers sold Steel Nails at \$2 and jobbers at \$2.10. In November the Wheeling manufacturers, by joint action, advanced their rates to \$2.12½. Chicago and the jobbers followed with an advance to \$2.15 for carload lots. Other manufacturers gradually adopted the Wheeling rate, which is now expected to be advanced slightly on account of new freight rates. Jobbers at present are quoting \$2.20 @ \$2.25 for Steel Nails. The Wire-Nail trade has followed the course of the Cut-Nail trade during the year, except that the gap between the prices of the two kinds of Nails has been considerably diminished. At the beginning of the year Wire Nails were usually quoted about \$1 above Steel Cut Nails, but now they are not more than 50¢ above on manufacturers' quotations, and 60¢ to 75¢ above the jobbers' quotations. In one respect there has been a startling difference during the year between Cut Nails and Wire Nails, and that is that at no time was the Wire Nail trade really dull.

General Hardware.—At present there is but little movement in Hardware, as is usual at this time of the year, when stock-taking absorbs the time of most merchants. The Chicago jobbers, in summing up the results of the year, however, will have no reason to find fault with the volume of business which has passed through their hands. As compared with previous years their trade has shown a very large increase.

Cincinnati.

Office of *The Iron Age*, Fourth and Main Sts.,
CINCINNATI, January 2, 1888.

Pig Iron.—The last week of the year has been about as dull as the two preceding weeks were active. Apparently the buyers who determined to anticipate the general buying movement in January rested from their labors or reconsidered the various propositions, and reversed their decision. But, whatever the cause, the fact remains that the past week has been a dull one in Pig Iron Circles at least the sales reported are small, only a few

100 or 50 ton or carload lots being sold, and generally at prices which have recently been current. What inquiry there has been has been almost exclusively for Foundry Iron. But while sales made directly through Cincinnati agents have been small, there are reports that the Louisville fraternity have been more successful, one lot of 5000 tons Foundry Iron and one of 2000 tons Mill Iron reported here to have been sold there and at such low prices that local sellers have been slow to credit the statements. There are also other rumors of weakness and cutting of prices, but Cincinnati representatives have not indulged their desire for business at the expense of prices, but the general talk is not very bullish. Sellers, however, persist in drawing the future in bright colors. "Things past and to come seem best; things present worst." There has been scarcely enough business reported as accomplished to warrant any change in the prices current. The quotations for cash here, f.o.b., are as follows: Hot-Blast Foundry Iron—Ohio and Southern Coke, No. 1, \$20 @ \$20.50; do., No. 2, \$19 @ \$19.50; do., No. 3, \$18 @ \$18.50; Ohio Soft Stonecoal, No. 1, \$20 @ \$20.50; do., No. 2, \$19 @ \$20; Mahoning and Shenango Valley Coke, No. 1, \$20.50 @ \$21; Hanging Rock Charcoal, No. 1, \$23 @ \$24; do., No. 2, \$22 @ \$23; Tennessee and Alabama Charcoal, No. 1, \$21 @ \$21.50; No. 2, \$19.50 @ \$20.50. Forge—Strong Neutral Coke, \$17 @ \$17.50; Mottled, \$16 @ \$16.50; Cold Short, \$16 @ \$17. Car-Wheel and Malleable—Southern Car-Wheel Iron, \$23 @ \$24; Hanging Rock, C. B., \$24 @ \$25; Lake Superior Malleable, \$22.50 @ \$23.50.

Old Rails.—There has been a moderate demand and a steady market for Old Wheels at \$20.50, but Old Rails have been dull and easy, and nominally quotable at \$23 ½ ton.

Nails.—The market has remained easy, the moderate jobbing demand being readily met at previous prices; 10d @ 60d sell at \$2 @ \$2.10 ½ keg, and other sizes at proportionate rates. Steel Nails sell at \$2.10 @ \$2.20 and Steel Wire Nails \$3 @ \$3.10 ½ keg.

Manufactured Iron.—The local mills have not yet resumed operations, but one at least will open this week, and the rise in the river is encouraging for a more ample supply of fuel, when the other establishments will be enabled to resume operations.

IMPORTS.

The imports of Iron and steel, Hardware, &c., at this port from December 21 to December 31, inclusive, were as follows:

Iron and Steel.		Tons.
Pig Iron: G. W. Stetson & Co.	350	
J. Williamson & Co.	300	
R. Crooks & Co.	100	
Crocker Bros.	701	
N. L. Bartlett	100	
Jas. Lee & Co.	400	
Spiegeleisen: C. L. Perkins.	1 700	
Crocker Bros.	224	
Naylor & Co.	520	
Steel: R. H. Wolff & Co.	35	
Carey & Moen	16	
W. F. Wagner	27	
A. Milne & Co.	16	
T. B. Coddington & Co.	13	
C. F. Boker	12	
M. Cohn & Co.	10	
J. Abbott & Co.	210	
Lalanc & G. Mfg. Co.	7	
Chas. Hugill	7	
F. S. Pilditch	7	
Newton & S.	4	
Steel Rods: Naylor & Co.	240	
R. H. Wolff & Co.	355	
A. Heyn	22	
Montgomery & Co.	11	
C. Hugill	9	
Carey & Moen	8	
Iron: Gustaf Lundberg	275	
J. Abbott & Co.	50	
E. G. Jacobus	114	
Iron Rods: Naylor & Co.	100	
Steel Sheets: Ogden & Wallace	35	
Naylor & Co.	10	
Lalanc & Grosjean Mfg. Co.	36	
Union Bridge Co.	79	
A. R. Whitney & Co.	252	
Sheet Iron: T. B. Coddington & Co.	45	

Steel Forgings: Thos. Prosser & Son	45
Steel Bars: Union Bridge Co.	29
Rivet Rods: G. Lundberg	50
N. Lillienberg	38
J. Abbott & Co.	35
Nail Rods: J. Abbott & Co.	25
Iron Beams: R. F. Downing Company	7
Swede Iron: A. Milne & Co.	75
Scrap Iron: Perkins & Co.	222
H. N. Holt	30
Channel Iron: J. G. Wilson	5
Iron Girders: R. F. Dowling & Co.	25
Angle Iron: E. G. Jacobus	5
J. S. Leng	2
Old S. Rail Ends: C. L. Perkins	300
Copper Ore: John Parsons & Co.	1,925
Type Metal: Jas. Fraser	79
Swede Bar Bnds.	Tons. 60
Cutlery: J. G. Witte & Bro.	Cases. 4

Tin Plates.

	Boxes.
Dickerson, Van Dusen & Co.	7,508
Phelps, Dodge & Co.	8,442
T. B. Coddington & Co.	5,945
N. L. Cort & Co.	4,018
A. A. Thomsen & Co.	4,012
Bruce & Cook	3,350
Central Stamping Company	3,320
R. Crooks & Co.	2,431
Naylor & Co.	2,382
G. B. Morewood & Co.	1,600
S. Shepherd & Co.	1,167
Pratt Mfg. Company	640
H. R. DeMilt & Co.	1,063
Hy. Whittemore & Co.	414
Merchant & Co.	350
C. S. Mersick & Co.	200
American Meter	85

Metals.

	Pounds.
Tin: Phelps, Dodge & Co.	111,685
D. Thomsen & Co.	22,407
Crooks S. and Rfing, Co.	22,400
Antimony: Phelps, Dodge & Co.	50
American Metal Co.	10
Irons and Metals Warehoused from December 21 to December 31, inclusive:	
Old Iron Rails: M. Frankfort	Tons. 248
Iron Rods: J. Abbott & Co.	115
Scrap Iron: Perkins & Co.	525
Exports of Metals from December 21 to December 31, inclusive:	
Old Brass: Burgess & Co.	Pounds. 5,702
Copper: American Metal Co.	215,315
Copper Matte: Williams & Terhune	3,075,289
E. T. Nichols	297,280
American Metal Co.	560,000

Hardware, &c.

Alexandre, F. & Sons, Mach'y, box, 1; Hardware, pkgs., 1	
Boettger & Hioe, Machine Parts, cs., 4	
Boker, Arms and Ironware, cs., 9; Mdse., cs., 2	
Curley, J. & Bro., cs., 1	
Field, Alfred & Co., Caps and Cartridge Cases, cs., 44	
Gleason Mfg. Co., E. P., cs., 2	
Graef Cutlery Co., cs., 23	
Gurney, F. B., cs., 7	
Hubbard, N., Vacuum Pump, 1	
Junze, F. W. & Co., Mdse., cs., 5	
Kastor, A. & Co., cs., 17	
Korting Gas Engine Co., cs., 5	
Kurscheidt Mfg. Co., Mach'y, cse., 1	
Lau, J. H. & Co., Cartridges, cs., 3	
Manhattan Bros. Co., Walrus Sides, 4	
McSorley, J. A. & Sons, Mach'y, pkgs., 47	
Mason, J. W. & Co., Wire Rope Coils, 8	
Schoverling, A. & Co., Arms, cs., 31	
Sellers, W. B., Mdse., cs., 2	
Suzarie & Whitney, Mach'y, cs., 58	
Taylor, Thos., Mdse., cs., 6	
The M. L. Ramsey Mfg. Co., cs., 1	
Todd, J. C., Mach'y, bxs., 9	
Tryon, E. K. & Co., Arms, cse., 1	
Uhlmann, S. & F., Mach'y, pgs., 189	
Vom Cleft & Co., Ironware, cs., 11	
Wiebusch & Hilger, Arms, cme., 1; Locks, cs., 7; Mdse., cs., 11	
Winchester Arms Co., Gun Barrels, cs., 6	
Witte, John G. & Bro., Cutlery, cs., 4	
Ward, Asiline, Mdse., cs., 2	

In our last issue we reported the imports of the Graef Cutlery Company, of New York as one case. It should have been six cases.

Iron manufacturers at Youngstown, Ohio, recently were notified by all the railroads except the Pittsburgh and Lake Erie that on January 2 the rate of 13 cents on iron would be advanced to 15 cents. One line stated that they intended to advance the rate to 17 cents. The iron men held a meeting and sent notices to the officials of the several lines, protesting vigorously against the proposed advance.

The Committee on Awards of the American Exhibition in London has awarded to Chambers, Bros. & Co., of Philadelphia, the manufacturers of the well-known Chambers brick machine, a diploma, which reads: "For a perfect brick machine." This is the highest award made by the exhibition authorities.

General Hardware.

There has been thus far less than the usual number of changes in list prices or quotations of Hardware, those which have been announced being referred to below. As usual at the opening of the year the volume of business is comparatively small, but there is something doing, and a confident and hopeful feeling prevails. The indications are regarded as pointing to a very good trade the coming season.

NAILS.

The New York Nail market has been quiet and steady at prices hitherto ruling. The amount of business done at this time of the year is usually light. During January and February Nail-makers usually accumulate considerable stock, which is generally called for during the busy spring season. Therefore the possible curtailment of production in Eastern Pennsylvania which may grow out of the Reading and Lehigh coal strikes should they continue for any length of time is not expected to influence prices in the near future to any extent. We quote \$1.90 on dock for Iron Nails, and \$2 to \$2.05 for small lots from store.

BARB WIRE.

In the East the market for Barb Wire is quiet and steady, with quotations for car-load lots of Four-Point Galvanized Barb Wire at 3.90¢.

MISCELLANEOUS PRICES.

The Brattleboro Tool Company, Brattleboro, Vt., whose New York office is with V. P. Humason, 80 Chambers street, have recently made the list on their No. 2 Steer's Patent Adjustable Extension Bit \$18 per dozen, instead of \$22, as heretofore. This Bit has two cutters, with a range, it is to be noted, of from $\frac{1}{2}$ to $1\frac{1}{2}$ inches, while other Bits listed at the same price are referred to as boring from $\frac{1}{4}$ to $1\frac{1}{2}$ inches. In connection with the advantage possessed by this Bit as thus boring a larger hole, the company refer to the fact that the Bits have been recently greatly improved and perfected, so that they are now put on the market with special claims for their excellence. The Bits at above list are subject to a discount of 40 and 50 per cent.

It is reported that the Ammunition Manufacturers' Association are about to announce a reduction in the price of Club, Rival and Climax Paper Shells. The discount on these goods, it will be remembered, is 15 per cent., but it is expected that the new price will be discount 33 $\frac{1}{3}$ and 10, with the usual cash discount of 2 per cent. This action, it is understood, has been taken on account of the presence in the market of outside goods which are offered at less than association rates.

There appears to be a disposition on the part of some of the manufacturers of Bright Wire Goods to extend their sales by offering larger discounts than have recently prevailed, and as a result some of them are making material concessions beyond what a short time ago were regarded as the extreme figures.

It will be remembered that by the action of the Carriage Bolt manufacturers, to which we referred two weeks ago, the regular discount on Common Carriage Bolts is made 70 and 15 per cent. instead of 70 and 10 per cent., with 3 per cent. for cash.

The market for Rope is decidedly weak, and prices have fallen away about $\frac{1}{4}$ cent on Manila and $\frac{1}{2}$ cent on Sisal.

A good many of the jobbing houses are selling Copper Rivets and Burrs at considerably better than 50 per cent. discount, which is the price at which the goods are held by the manufacturers.

The Shepard Hardware Company, Buffalo, N. Y., announce that owing to the fact that the list price on Surface Blind Hinges for brick is entirely out of proportion, considering the cost, to the list price for Wood Hinges, they have advanced the list on their Surface Blind Hinges for brick to the following figures:

	Per dozen sets.
No. 3, Gravity Blind Hinges.....	\$ 6.25
No. 5, Gravity Blind Hinges.....	12.50
No. 60, Noiseless.....	6.25
No. 65, Noiseless.....	7.00
No. 55, Noiseless (extra heavy).....	15.00

The list prices for Surface Blind Hinges for wood, Nos. 1, 50, 20, 30, 10, 75, &c., remain as heretofore, \$3.50 per dozen sets.

Newlin, Knight & Co., 337 Market street, Philadelphia, are sending a circular to their customers in which they state that they have in stock about 600 pairs of Arctic All-Clamp Club Skates, steel runners, assorted, 8 to 11 inch. They are offered, subject to stock when order is received, at 45 cents per pair, and, in 50-pair lots, at 40 cents per pair, net cash.

The advance in the price of Metals has had a strengthening effect on the Rule market, and the manufacturers are referring to the necessity for an advance. Stephens & Co., Riverton, Conn., for whom V. P. Humason, 80 Chambers street, New York, is agent, have in fact already announced an advance of 10 per cent. on their goods. This advance is referred to as only covering the increased cost of the Brass.

Lane's Razor Blade Scoville Pattern Hoes, manufactured by Lane & Gale, Troy, N. Y., are quoted at discount 30 per cent.

The following circular, relating to the genuine Coes's Wrenches, has been issued under date New York, January 2, 1888, by J. C. McCarty & Co., 97 Chambers street, New York, agents for L. Coes & Co., and John H. Graham & Co., 113 Chambers street, New York, agents for A. G. Coes & Co.:

"We are instructed to quote from this date Coes's Genuine Screw Wrenches, of either make, 55 per cent. discount from list. A special discount of 10 per cent. will be allowed on specified orders for 50 dozen, for immediate shipment. Terms, 90 days, or 3 per cent. discount for cash in 10 days. Parties having purchased the quantity will be entitled to the extra discount on subsequent orders during balance of season ending June 30, 1888. Above quantity must be taken from either the one or the other manufacturer to be entitled to the quantity discount."

THE STANLEY RULE AND LEVEL COMPANY, New Britain, Conn., and 29 Chambers street, New York, have issued a new catalogue for 1888, which represents their line of improved labor-saving Carpenters' Tools, embracing those with which the trade are familiar, together with the new goods which have recently been added. The catalogue is printed in their usual convenient and attractive style, with excellent illustrations and abundant descriptive matter. For the convenience of buyers, salesmen and entry clerks a condensed price list is issued, and their attention is called to the new goods contained in it—a feature of the company's annual announcements which is appreciated by the trade. The new goods are the following:

Boxwood Caliper Rule.	
No. 13 $\frac{1}{2}$, Square Joint, Two Fold, 8ths and 16ths of inches, $1\frac{1}{2}$ inch wide.....	per doz., \$12.00
Ivory Caliper Rule.	
No. 40 $\frac{1}{2}$, Square Joint, German Silver, Bound, Two Fold, 6 inches, 8ths and 16ths of inches, $\frac{3}{8}$ -inch wide.....	per doz., 24 00
Mason's Plumb and Level.	
No. 8, Mason's Plumb and Level, Arch Top Plate, Two Plumbs, Two Side Views, Polished, 42 inches in length.....	per doz., 35.00
Improved Try Squares, No. 12.	
Iron Handle, Graduated Steel Blade, Square inside and out, 2 inches.....	per doz., 2.25

Nickel-Plated Block Planes.	
No. 16, Excelsior Block Plane, 6 inches length, $1\frac{3}{4}$ -inch Cutter, with Stanley's Lateral Adjustment, Nickel-Plated Trimmings.....	1.65
No. 17, Excelsior Block Plane, 7 inches length, $1\frac{3}{4}$ -inch Cutter, with Stanley's Lateral Adjustment, Nickel-Plated Trimmings.....	1.75
Knuckle-Joint Block Planes.	
No. 18, Knuckle-Joint Block Plane, 6 inches length, $1\frac{3}{4}$ -inch Cutter, Stanley's Lateral Adjustment, Nickel-Plated Trimmings.....	1.75
No. 19, Knuckle-Joint Block Planes, 7 inches length, $1\frac{3}{4}$ -inch Cutter, Stanley's Lateral Adjustment, Nickel-Plated Trimmings.....	1.85
Stanley's Clapboard (Siding) Gauge.	
No. 89, Metal Stock, with Wood Handle, Steel Blades (3 in a box).....	each, .50
Stanley's Adjustable Chisel Gauge.	
No. 96, Chisel Gauge, Steel Stock.....	per doz., 2.40
Stanley's Rule Trammel Points.	
No. 99, Rule Trammel Points, set of three in a box.....	per set, .50

The following is the discount sheet applying to the catalogue, there being an additional discount of 10 per cent. for cash if paid within 30 days:

	Discount per cent.
Awl Hafts.....	45
Awls, Patent Pegging.....	45
B-ader, Stanley's Universal.....	20
Bevels, Sliding T.....	60
Bevels, Patent Flush Eureka.....	30
Bit and Square Level.....	20
Box Scraper, Adjustable.....	30
Brad Awls, Handled.....	30
Clapboard Marker.....	20
Clapboard Gauge.....	20
(Chalk-lines, Reels and Awls.....	30
Carpenters' Tool Handles.....	30
Chisel Gauge.....	20
Countersinks, Wheeler's Patent.....	30
Dado, Filletster, Plow, &c., combined.....	20
Dado, Adjustable.....	20
Gauges.....	60
Gauges, with Improved Face-Plate.....	60
Handles, Brad Awl.....	30
Handles, Plane.....	40
Handles, Saw.....	40
Handles, Screw Driver.....	50
Hammers, Magnetic.....	30
Hammers, Tack No. 4.....	30
Hammers, Steak.....	30
Hammers, Upholsterers.....	30
Hollows and Rounds for Plane No. 45.....	20
Level, Bit and Square.....	20
Level Glasses.....	70
Mallets, Hickory, Lignumvitae.....	20
Miter Box, Improved.....	20
Miter Squares, Improved.....	30
Miter Try Squares, Improved.....	30
Plumbs and Levels, Non-Adjustable.....	70
Plumbs and Levels, Patent Adjustable.....	70
Plumbs and Levels, Nicholson's Patent.....	30
Plumbs and Levels, Iron Frame.....	30
Plumbs and Levels, Machinists'.....	30
Pocket Levels.....	70
Planes, Bailey's Adjustable, Iron.....	30
Planes, Bailey's Adjustable, Wood.....	30
Planes, Stanley Adjustable, Block.....	30
Planes, Stanley Adjustable, Iron.....	30
Planes, Stanley Adjustable, Wood.....	30
Planes, Stanley Adjustable, Block.....	30
Plane Irons.....	30
Planes, Beading.....	20
Planes, Beading, Rabbet and Slitting.....	20
Planes, Chamfer.....	20
Planes, Floor.....	20
Planes, Rabbet.....	20
Planes, Rabbet and Filletster.....	20
Planes, Router.....	20
Planes, Tonguing and Grooving.....	20
Planes, Victor Adjustable.....	20
Plow, Filletster, &c., combined.....	20
Plow and Matching Plane, Bull-Nose.....	20
Plumb Bobs, adjustable.....	30
Rules, Boxwood, Stanley's.....	75
Rules, Ivory, Stanley's.....	50
Rules, Ivory, Stearn's.....	50
Rules, Miscellaneous, Stanley's.....	60
Sash Cord Irons.....	30
Scratch Awls, Handled.....	30
Screw Drivers.....	65
Patent Improved.....	60
Screw Drivers, No. 86.....	70
Spoke Shaves, Bailey's.....	40
Spoke Shave Cutters, Bailey's.....	40
Trammel Points.....	30
Trammel Points, for Rules.....	20
Tool Handles and Tools, Excelsior.....	30
Try Squares, No. 20.....	60
Try Squares, Adjustable, No. 14.....	30
Try Squares, Iron Handle, No. 12.....	30
Try Squares, Inlaid, No. 10.....	30
Try Squares, Plumb and Level.....	30
Try Square and Bevel, combination.....	30
Try and Miter Square, Winterbottom's.....	30
Veneer Scrapers.....	30

ITEMS.

Announcement is made under date December 31 of the dissolution of the firm of Louderback, Gilbert & Co. by limitation and mutual consent; and, under date of January 2, that a copartnership has been formed, consisting of J. A. Gilbert, Edwin S. Sweet and Henry M. Lyon, under the firm name of Gilbert, Sweet & Lyon, who will conduct the wholesale Hardware business at the old stand, 33 Chambers street, New York

We learn that Greene, Tweed & Co., 83 Chambers street, New York, have purchased a controlling interest in the Excelsior Mfg. Company, of Birmingham, Conn., and will put in the necessary capital to largely increase their manufactured product. After January 1 the office and salesroom of the company will be at 83 Chambers street, New York, where inquiries and orders should be addressed. The advertisement on page 135 will be of interest as illustrating some of their specialties.

J. C. McCarty & Co., 97 Chambers street, New York, have arranged with Edward Ingalls to represent them in the South and West, in connection with the Atha Tool Company, Newark, N. J., whom, as for several years past, Mr. Ingalls will continue to represent. The varied line of goods which he is thus in a position to offer to the trade, besides the important manufactures of the Atha Tool Company, are indicated in J. C. McCarty & Co.'s advertisements, which appear on pages 202, 203 and 204.

L. S. Starrett, Athol, Mass., advises us that in about three weeks he will receive the first edition of his 1888 catalogue, in which a number of new and valuable tools will be represented in addition to his former line. Among these are a Micrometer Caliper Square, a Universal Bevel Protractor, Solid Hardened Edge Steel Squares and a new Extension Divider. He has also remodeled his Surface Gauge, and now refers to its superior excellence. He has also bought out, it will be remembered, the Fay's Patent and Yankee Calipers and Dividers, including the entire plant for their manufacture, and has perfected the Quick-Adjusting Spring Nut for Calipers and Dividers.

It will be seen that on page 136 the E. Walker Tool Company, Erie, Pa., illustrate their Walker's Adjustable Face Plane. This tool, which we understand has been meeting with special favor from the trade and mechanics, is referred to as covering the greatest range of work of any Plane in the market, and has 30 different shaped bits. This Plane, together with the other goods manufactured by the company, are fully described in their catalogue.

Announcement is made, December 31, 1887, that the copartnership existing between H. R. Grove and H. E. Winner, under the firm name of Grove & Winner, Philadelphia, is mutually dissolved. In connection with this announcement it is stated that the Philadelphia Cutlery Company, comprising Weightmann W. Farr, John W. Hart, Harry E. Winner, E. H. Middleton, Aaron I. Sanson, Jr., and Aaron I. Sanson, will continue to carry on their former line of business, in addition to that of Grove & Winner, at their late place of business, 516 Commerce street.

The trade will observe the advertisement of the Enterprise Mfg. Company, Philadelphia, Pa., which occupies page 87, and in which some of their leading manufactures are illustrated. The announcement that they are putting a new Lawn Mower on the market will be of especial interest. This they are making in all sizes, from 10 to 18 inches, and make high claims for its merits.

The trade will be interested in the illustration of Henry's Patent Orange Shears, which is illustrated in their advertisement on page 91. It is manufactured by John T. Henry, Hamden, Conn.

The Hardware store of Oliver Cowan & Co., Shelbyville, Tenn., was destroyed by fire on the night of the 14th ult., and its contents, with the exception of a few hundred dollars' worth, was burned. They are making, we understand, active preparations for immediate resumption of business.

It will be seen that Richard G. Lewis, of Chillicothe, Ohio, illustrates his Knives with Thumb Supporter in his advertisement on page 74.

The trade will be interested in the imposing list of agencies announced on page 97 by John H. Graham & Co., 113 Chambers street, New York. It will be observed that a large variety of goods, many of which are made by leading houses, are thus offered to the trade.

Charles B. Holdrege, Bloomington, Ill., sends out a neat calendar and greeting, in which he wishes to his friends a happy and prosperous New Year, while at the same time attention is called to some of the leading lines of the Simmons Hardware Company, whom he represents.

The trade will observe the announcement on page 128 of the Celluloid Mfg. Company and the Celluloid Varnish Company, Newark, N. J. It will be seen that the former announce that they have granted to the latter exclusive license, under their various patents, to manufacture Lacquers and Transparent Varnishes from Pyroxyline, at the same time cautioning the trade against infringements, and stating that a test suit in regard to infringement of same in the manufacture of Varnishes made of Pyroxyline has been commenced by them. The Celluloid Varnish Company in their announcement also refer to the matter, and allude especially to their Crystalline and their Dip and Brush Lacquers, as offered at the lowest prices, with the assurance to the trade that they are protected in their use.

The Lloyd & Supplee Hardware Company, Philadelphia, announce January 2, as per the special notice, page 67, that William D. Supplee has this day been admitted into the firm, which now consists of William J. Lloyd, William W. Supplee, William S. Lloyd and William D. Supplee.

The trade will observe the advertisement occupying the page in which J. H. Williams & Co., 9-15 Richards street, Brooklyn, N. Y., illustrate a variety of their Drop Forged Engineers' Wrenches and Chain Pipe Wrenches, Thumb Screws, Shafting Collars, &c., and call attention to their Iron, Steel and Copper Drop Forgings of every description.

The Francis Axe Co., Buffalo, N. Y., advise us that they have made the following arrangements for the sale of their goods during the coming season: Chas. M. Hopkins will represent them in the South; their D. F. Kemp will look after the large trade in the West and Northwest, and Hand, Maxwell & Co., New York, will cover New England, New York and Eastern Pennsylvania. Their new illustrated catalogue will be ready for distribution early in January, and it is intimated that it will be gotten up in very attractive form.

The firm of Buehler, Bonbright & Co., Philadelphia, has been dissolved by the deaths of Geo. Bonbright and Chas. P. Suesserott, and a new copartnership has been formed under the firm name of Buehler, Bonbright & Co., in which the surviving partners of the former firm, Edward D. Eyre and Thomas A. Fleck, are associated with J. S. Bonbright and G. W. Molloy. It is also stated under the same date that Alfred N. Diller and Edward H. Remsen have been admitted to an interest in the business. The new house thus constituted will carry on a jobbing Hardware business at 427 Market street and 416 Commerce street, Philadelphia. In connection with this reformation of the firm, which we understand is the oldest wholesale Hardware house in Philadelphia, it is of interest to review in outline its history. The business was established in 1829 by Martin Buehler, who was succeeded by Martin Buehler & Brother, until by the death of John Buehler and the admission

of Robert H. Howard it became Buehler & Howard. In 1863 George Bonbright and Chas. P. Suesserott were admitted as partners, when the firm was changed to Buehler, Howard & Co., and on the retirement of R. H. Howard in 1872 and the admission of Edward D. Eyre and Thomas A. Fleck the firm name was changed to Buehler, Bonbright & Co. The recent deaths of George Bonbright and Chas. P. Suesserott, one of whom died December 4 and the other December 13 of last year, necessitated the reorganization of the firm, as stated above. The trade of the house has amounted annually, we understand, to nearly half a million of dollars, and has been confined to the States of Pennsylvania, New Jersey, Delaware and Maryland. In announcing the reorganization of their business, the new firm allude to the fact that they are better than ever prepared to meet the wants of the trade, by reason of increased force and capital, and express the hope that they will merit the liberal patronage bestowed on the old firm.

The trade will observe among the special notices on page 67 one in which a gentleman advertises for a location for a Hardware store, retail or jobbing, in Michigan, Wisconsin, Dakota, Minnesota or Washington Territory, alluding also to his willingness to buy an interest in such an establishment already in operation. The advertiser alludes, it is to be noted, to his experience and to the capital at his command.

Buck Bros., Millbury, Mass., announce that they make no change in the quotations of their goods for the coming season, referring to the present price of material and the high wages they pay their skilled workmen as not permitting them to sell the goods at lower prices than they did during the past year. They state that the year 1887 was the most prosperous one in their history, which dates from 1853, their sales being far in excess of those of previous years. They further say:

"We have enlarged our works and shall be able the coming year to fill orders with our usual promptness. It is our determination now as it has ever been to make tools that shall command the praise of the trade for their quality, and superior excellence. Some dealers may think our goods too dear, but we claim they are the cheapest to the consumer, and that we are bound to make them worth all we ask for them."

In their advertisement occupying page 115 the Van Wagoner & Williams Company, 82 Beekman street, New York, call attention to the Spring Hinges of the Hold-Back variety, the Hero and Monarch, which are referred to as possessing exceptional merit. The Monarch has recently been put on the market, while the Hero is alluded to as having already won the confidence of buyers. In their circular announcing these goods to the trade the manufacturers mention that they have engaged the services of L. F. Blue, formerly of the Simson & Gault Manufacturing Company, for next year. He will travel for them exclusively, on salary, and will solicit orders for their line of specialties.

E. T. Fraim and M. W. Fraim, Lancaster, Pa., announce under date January 2 that the partnership heretofore existing between them under the firm name of E. T. Fraim & Bro. is dissolved by limitation, M. W. Fraim retiring. The business of manufacturing Scandinavian or Jail Padlocks will continue uninterrupted by E. T. Fraim, who has assumed all the firm's liabilities and who is authorized to collect the outstanding accounts. In connection with this announcement E. T. Fraim, mentioning that he has taken entire control of the Keystone Lock Works, alludes to his many valuable patents on Padlocks, and his purpose to continue to maintain the quality of his manufactures.

CHANGES IN THE FIRM OF WILLIAM BLAIR & CO.

The wholesale Hardware house of William Blair & Co., Chicago, has been so long and so favorably known throughout the entire trade that the changes which have just been made in the firm are of more than passing interest. On the 1st instant William Blair and his son, Edward T. Blair, retired. The remaining partners, namely, James M. Horton and Albert E. Roof, in connection with Edwin W. Gilmore and David McWilliams, have organized a stock company to succeed to the business of the firm under the name of Horton, Gilmore, McWilliams & Co. Of the new firm Mr. Horton is president and manager of the business; Mr. Gilmore is vice-president; Mr. McWilliams, treasurer; and Mr. Roof, credit man and cashier. The authorized capital is \$300,000, but if more than that

Stimson. Chauncey B. Blair is still living and is president of the Merchants' National Bank, of Chicago. His record as an able financier is well known to the people of that city. In 1849 the property at 176 Lake street was purchased by the firm and the store removed thither. In 1850 Mr. Stimson died. From 1850 to 1853, Mr. Blair conducted the business under his individual name. In 1853 C. B. Nelson was admitted to partnership, and the name of the house again became William Blair & Co., not to be changed until the present time. Mr. Nelson continued in the firm until 1882, when he retired, dying in 1885. Oliver W. Belden was a member of the firm from 1855 to 1870, when he also retired and died a few years afterward. In 1865 more room was needed for the business of the firm, and a removal was effected to 179 and 181 Randolph street.

vicissitudes that have shaken the strongest houses, he never failed to meet an obligation when it became due, and never had a note protested. Through the terrible panic of 1857 he passed unscathed, while other large houses, in the West especially, were obliged to make terms with their creditors, many of them being completely forced out of existence. The business of his house increased with a steady and healthy growth from its start. The policy followed was to keep up with the times in all methods of doing business, and always to be in the market with goods, whatever the price might be, thus maintaining a hold on trade. Mr. Blair now retires from the Hardware business to give more time to other interests, in which his son will ably assist him. Between them and James M. Horton, who now becomes head of this great house, there has always been the most cordial feeling, and in retiring they carry with them not only his regrets at the severance of the ties which have so long existed, but also the enduring respect and hearty good wishes of all their other associates and employees.

James M. Horton, now the senior member of the firm, whose portrait is presented herewith, was born in Columbia County, N. Y. He acquired his early training in the Hardware business at Albany, commencing his apprenticeship with the old house of Pruyn, Wilson & Vosburgh and graduating from Erastus Corning & Co. In 1866 he entered the service of William Blair & Co. and removed to Chicago. His early training at Albany proved to be of special value in the West. He was not only thoroughly conversant with the trade in Shelf Hardware, but also in Heavy Hardware, and had at the same time much experience in conducting the importation of goods, which at that time was an important feature in the transactions of all large Hardware houses. The management of the business of William Blair & Co. gradually fell upon his shoulders, his fitness having been thoroughly tested before he was admitted to partnership on January 1, 1871. Although the general policy of the house has been controlled by Mr. Blair, the active management of the details of the business has for many years been directed by Mr. Horton. Recognizing the excellent results which have attended the principles laid down by Mr. Blair for his own guidance, no departure from them is contemplated by his successor. The business will be managed on the old lines as far as possible, but within them an element of progressiveness and of properly regulated business ambition will be introduced. Nothing startling is contemplated, prices will not be cut to attract trade hitherto uninfluenced, and the traveling force will not be considerably increased. But the new firm do expect to increase the trade which has been transferred to them by William Blair & Co. and will use all honorable means to carry their intentions to a successful accomplishment.

The building in which the new company are housed, at 172, 174 and 176 Lake street, was built expressly for the Hardware business, as stated above, and is very well adapted to it to-day, although erected in 1872. It has a frontage of 60 feet on Lake street and is 144 feet deep, extending to an alley of good width for the handling of teams in receiving and shipping. It is five stories high, with a basement 60 feet by 166 feet. The whole building is well lighted and is supplied with two elevators, enabling goods to be transferred easily and quickly from one floor to another. The offices are on the ground floor, occupying the center of the room and arranged somewhat like the interior of a bank. In addition to the storage room for goods in this large building, it is frequently necessary to carry additional stock outside, generally in public stores. The line of goods carried by this



JAMES M. HORTON.

is needed it can easily be furnished by the new members of the house, who are possessed of ample means.

The retirement of William Blair from the Hardware business is in itself an event. In 1842, almost half a century since, Mr. Blair opened a Hardware store in Chicago, at the southeast corner of Dearborn and South Water streets. From that time until now, without an interruption, he continued in the business, the house which he then established being to-day the oldest Hardware house in Chicago, and its firm name being among the oldest of any kind in any line of business in that city. It was the first exclusively wholesale Hardware house in Chicago. When established it covered both wholesale and retail trade, but about 1848, after the completion of the Illinois and Michigan Canal, the retail department was discontinued. It was then the only wholesale Hardware house in the West, outside of St. Louis. Mr. Blair was born in Homer, Cortland County, N. Y., in 1818, received his training in the Hardware business from Oren North, of Cortland, removed to Joliet, Ill. in 1836 and to Chicago in 1842. In 1844 his brother, Chauncey B. Blair, became interested in the business, and the firm name of William Blair & Co., was first adopted. In 1846, his brother retired, and a brother-in-law, William E. Stimson, took an interest, the firm name then being changed to Blair &

In 1866 James M. Horton entered the employment of the house and was admitted to partnership on January 1, 1871. In the great fire in October of that year the entire property of the firm was swept away, but in fifteen days their business was in good running order at 30 and 32 South Canal street, where a vacant store building was fortunately secured on the day after the fire. The burned property was well covered by insurance. In 1872 a removal to larger quarters was necessitated, and the property at 172 and 174 Lake street was purchased, adjoining the old store at 176 from which they had removed in 1865, but which they still owned. A new building was erected covering the three entire lots. It was arranged with special reference to the hardware business, and continues to be the quarters of the firm. From 1873 to 1881 Augustus O. Hall was a member of the firm, but he is now engaged in another line of business in Chicago. In January, 1882, Edward T. Blair was admitted to partnership, and Albert E. Roof in January, 1884.

In the management of this business Mr. Blair has been pre-eminently distinguished for his exactness, carefulness and conscientiousness. He has always endeavored to be just, and his character for probity, business honesty and thorough integrity is without a blemish. During the whole of his long mercantile career, passing through

house has always been of a general character, no special attention being given to one branch. A full assortment is kept of Shelf and other Hardware, Tin Plates and Tinner's Stock, together with House-Furnishing Goods and such Tools and Implements as are in general use by mechanics and farmers.

TRAVELING MEN'S ASSOCIATIONS.

The thirteenth annual meeting of the Northwestern Traveling Men's Association was held in the Madison Street Theater, Chicago, on the 27th ult. About 200 delegates were present, from 15 States. The address of President James C. Miller showed the association to be in the most prosperous condition in its history. The report of the secretary, Charles H. Hinman, showed the following figures: Present membership, 3909; new members received during past year, 276; loss by delinquents, 164; loss by death, 25; net gain during year, 87; total amount paid to beneficiaries since organization, \$905,520; average amount paid to beneficiaries, \$4,868.39; expense per capita to members during 1887, \$233; cash balance December 23, 1886, \$10,689.68; total receipts of year, \$157,357.63; total expenses, \$149,840.68; cash on hand, \$7,516.95.

The election of officers for the ensuing year resulted as follows, re-elections being designated by a *; President, James C. Miller,* Chicago; vice presidents, William H. Cribben, Chicago; Webb Hultz,* Chariton, Iowa; F. E. Boswell, St. Paul, Minn.; William T. Mayhew, Janesville, Wis.; J. B. Heywood,* St. Paul, Minn.; A. W. Culver, Detroit, Mich.; Henry Rindskopf,* Cincinnati, Ohio; M. C. Wetmore,* St. Louis, Mo.; C. L. Knapp, Leavenworth, Kan.; H. H. Dean, Lincoln, Neb.; William M. Gamble, Pueblo, Col.; secretary and treasurer, Charles H. Hinman,* of Chicago; board of directors (for two years), Conrad Wilkowsky,* James S. Gadsden,* Francis Etheridge, T. J. Garrigan, William H. Russell, all of Chicago. The salary of the secretary and treasurer was fixed at \$3000 per annum. There was a long and warm discussion over the payment of salary to the president. It was finally decided to allow the association to vote, at the end of the year, whatever amount it decided upon to the president; not to create a fixed salary. The association adjourned to meet in Chicago on Thursday, December 27, 1888.

At Davenport, Iowa, on the 28th ult., the Iowa Traveling Men's Protective Association enjoyed a parade with the thermometer indicating 12° below zero. The procession was two miles in length and was headed by the City Council and Company A, Iowa State Guard. Then came the Davenport Business Men's Association of 100 members and the Davenport Post-travelers' Protective Association, 300 strong, carrying fans and wearing straw hats and linen dusters over fur caps and coats. The trade display represented nearly every manufactory and wholesale house in the city, some having six teams with as many floats in the line. Altogether there were 200 floats, wagons and sleighs representing the different industries, and nearly 1000 men on foot carrying banners and emblems or devices illustrative of their business. In the afternoon a formal reception was given the traveling men at Barth's Opera House. Mayor Claussen delivered an address of welcome, which was responded to by F. W. Smith, State President of the Travelers' Protective Association. O. P. Pindell, of Xenia, Ohio, the national president, delivered the oration. At the banquet in the evening 900 covers were laid. Speeches were made by a number of those present.

TACKS.

Many of the leading Tack manufacturers, including most of the oldest and largest, have agreed in adopting a revised Tack list, which will be found in full on the next page. In this list there is, it will be observed, an advance in the large sizes, it having been found that with the extensive discounts now prevailing these goods were selling at a disproportionately low figure. It is to be noticed that besides the advance on the large sizes of Tacks the $\frac{1}{2}$ and $\frac{3}{4}$ weights have all been advanced, as they are now more than $\frac{1}{2}$ or $\frac{3}{4}$, respectively, of the prices of the full weight, action which has been taken with a view to discouraging the sale of these goods and inducing the purchase of the full weight. The recent rise in price of metals has also had its influence upon lines which are thus affected. This revised list, which is known as the list of January 2, 1888, is sent out in connection with a discount sheet, which we give below, in which it will be observed that there is a reclassification of the goods. The discount sheet is as follows, and is subject to an additional discount of 10 and 2 per cent. for cash:

American Iron Carpet Tacks, all kinds.....	72½ %
Steel Carpet Tacks, all kinds.....	72½ %
Swedes Iron Carpet Tacks, all kinds.....	72½ %
American Iron Cut Tacks.....	70 %
Swedes Iron Tacks.....	67½ %
Swedes Iron Upholsterers' Tacks.....	67½ %
Tinned Swedes Iron Tacks.....	67½ %
Tinned Swedes Iron Upholsterers' Tacks.....	67½ %
Gimp and Lace Tacks.....	67½ %
Tinned Gimp and Lace Tacks.....	67½ %
Swedes Iron Trimmers' Tacks.....	67½ %
Swedes Iron Miners' Tacks.....	67½ %
Swedes Iron Bill Posters' or Railroad Tacks.....	67½ %
Swedes Steel Tacks, all kinds (Swedes Iron price list).....	72½ %
Copper Tacks.....	39½ %
Copper Finishing, Trunk and Clout Nails.....	39½ %
Finishing Nails.....	60 %
Trunk and Clout Nails.....	60 %
Tinned Trunk and Clout Nails.....	60 %
Basket Nails.....	60 %
Common and Patent Brads.....	60 %
Hungarian Nails.....	60 %
Chair Nails.....	60 %
Zinc Glaziers' Points.....	40 %
Cigar-Box Nails.....	45 %
Picture-Frame Points.....	45 %
Looking-Glass Tacks.....	45 %
Leathered Carpet Tacks.....	45 %
Brush Tacks.....	45 %

Loring & Parks, Plymouth, Mass., for whom John H. Graham & Co. are selling agents, 113 Chambers street, New York, in issuing the revised Tack list make also an announcement in regard to their method of putting up the goods with different weights to meet the varying requirements of the trade. By this method, which they now announce, Tacks can be purchased either Straight, Star, Standard or Special weight, and in order that the trade may understand precisely what each of these weights signifies the following explicit information is given, the Straight weights being designated by one star, the Star weights by two stars, the Standard weights by three stars, and the Special weights by four stars:

Schedule Weights of Dozened Hardware List Goods. Ounces per Dozen, including Paper Boxes and Wrappers.

Ounces.	Straight Weights.			Star Weights.			Standard Weights.			Special Weights.		
	Full.	$\frac{1}{2}$.	$\frac{3}{4}$.	Full.	$\frac{1}{2}$.	$\frac{3}{4}$.	Full.	$\frac{1}{2}$.	$\frac{3}{4}$.	Full.	$\frac{1}{2}$.	$\frac{3}{4}$.
1	12	6	11	5	11	5	11	5	11	5	11	5
$\frac{1}{2}$	18	9	17	8	17	8	17	8	17	8	17	8
$\frac{3}{4}$	24	12	20	10	20	10	20	10	20	10	20	10
2	30	15	27	13	26	13	26	13	26	13	26	13
$\frac{5}{8}$	36	18	34	16	34	16	34	16	34	16	34	16
$\frac{3}{4}$	48	24	46	22	46	22	46	22	46	22	46	22
3	72	36	68	32	64	32	64	32	64	32	64	32
$\frac{5}{4}$	96	48	90	42	80	42	80	42	80	42	80	42
4	120	60	112	53	100	53	100	53	100	53	100	53
$\frac{5}{2}$	144	72	136	68	120	68	120	68	120	68	120	68
5	168	84	160	78	134	78	134	78	134	78	134	78
$\frac{3}{2}$	192	96	184	88	148	88	148	88	148	88	148	88
6	216	108	208	98	160	98	160	98	160	98	160	98
$\frac{7}{2}$	240	120	230	108	180	108	180	108	180	108	180	108
7	264	132	252	118	190	118	190	118	190	118	190	118
8	288	144	272	128	200	128	200	128	200	128	200	128

Uniform Weights.—Steel Carpet Tacks.

Straight Weights.	Star Weights.	Standard Weights.	Special Weights.
Blued, Bright Tinned, Coppered.	Blued, Bright Tinned and Coppered.	Blued and Bright only	Tinned and Cop'd only
A uniform 24 ounces.	21 ounces.	A 16 ounces.	16 ounces
2A uniform 48 ounces.	42 ounces.	2A 32 ounces.	32 ounces
		Tinned and Cop'd only	
		A 18 ounces.	18 ounces
		2A 36 ounces.	36 ounces

Hungarian Nails.

	Straight Weights.	Star Weights.	Standard Weights.
3 lb. list.	48 oz.	42 oz.	36 oz.
2½ lb. list.	44 oz.	38 oz.	32 oz.
2¼ lb. list.	40 oz.	34 oz.	28 oz.
2½ lb. list.	36 oz.	32 oz.	24 oz.
2 lb. list.	32 oz.	28 oz.	20 oz.

They state that they will endeavor to have all packages conform accurately to the above schedule, but that they will not be responsible for variations of weights on single dozens not exceeding two ounces more or less than the schedule weights, as it is impossible to avoid such variations. On full cases, however, they guarantee conformity to the schedule weights, to not exceeding a variation of one ounce per dozen per case. Assorted papers of American Iron Tacks they pack only in Straight and Standard weights. They issue a discount sheet on their Straight weights, which is the same as that given above, and also send out the following, which it will be seen relates to the different weights above described, the discounts being graded according to the weights.

In addition to the following discounts an extra 10 and 10 and 2 per cent. for cash is given. Freight paid to points on or east of the Mississippi:

Goods Packed, Dozened and M'd.	Straight weights.	Star weights.	Standard weights.	Special weights.
American Carpet Tacks, Blued.....	72½ %	72½ & 5 %	75 %	.....
American Carpet Tacks, Tinned and Coppered.....	72½ %	72½ & 5 %	75 %	75 & 10 %
Steel Carpet Tacks, Bright and Blued.....	72½ %	72½ & 5 %	75 %	.....
Steel Carpet Tacks, Tinned and Coppered.....	72½ %	72½ & 5 %	75 %	75 & 10 %
American Iron Tacks.....	70 %	70 & 5 %	70 & 10 %	.....
Swedes Iron Tacks, S. S.....	72½ %	72½ & 5 %	75 %	.....
Swedes Iron Tacks, Lanc.....	67½ %	67½ & 5 %	70 & 10 %	.....
Gimp and Lace Tacks.....	67½ %	67½ & 5 %	70 & 10 %	.....
Hungarian Nails.....	60 %	60 & 5 %	65 & 5 %	.....
Miners' Tacks, S. S.....	70 %	70 & 5 %	70 & 10 %	.....
Miners' Tacks, Lanc.....	67½ %	67½ & 5 %	67½ & 10 %	.....
Common and Patent Brads.....	60 %	60 & 5 %	65 & 5 %	.....
Leathered Tacks.....	45 %	45 & 5 %	50 %	.....
Brush Tacks.....	45 %	.....	.....	.....
Looking Glass Picture Frame Points.....	45 %	.....	.....	.....
Copper Tacks.....	39½ %	.....	.....	.....

Pounds, pound or half pound papers or bulk.

Swedes Iron Tacks, Lanc.....	67½ %	.....	.....
Swedes Iron Tacks, S. S.....	72½ %	.....	.....
Finishing Nails.....	60 %	.....	.....
Trunk and Clout Nails.....	60 %	.....	.....
Hungarian Nails.....	60 %	.....	.....
Basket Nails.....	60 %	.....	.....
Chair Nails.....	60 %	.....	.....
Cigar Box Nails.....	45 %	.....	.....
Copper Trunk and Finishing Nails.....	39½ %	.....	.....

We append the revised list for Tacks, Brads, &c., referred to above:

TACKS, BRADS, &c.

LIST JANUARY 2, 1888.

Full Weight.	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	4	6	8	10	12	14	16	18	20	22	24
Swedes Iron Tacks*	60	70	80	90	100	110	120	140	160	190	230	270	310	340	380	420	460	500
Tinned Swedes Iron Tacks*	100	110	130	150	170	190	200	210	250	280	340	400	450	500	570	630	700	760
Gimp and Lace Tacks	100	110	120	130	140	150	160	180	200	220	250	290	330	360	400	450	500	550
Tinned Gimp and Lace Tacks	130	140	160	190	210	230	250	260	270	300	360	410	470	530	600	660	730	800
American Iron Tacks†			80	90	90	100	110	120	130	150	180	210	240	270	300	330	360	390
Tinned American Iron Tacks†							160	180	200	220	270	310	360	410	460	510	560	610
Hungarian Nails, American Iron							70	90	110	130	150	180	200	220	240	260		
Hungarian Nails, Swedes Iron							80	100	120	150	170	200	220	250	270	290		
Copper Tacks	112	112	112	130	140	160	180	200	252	336	420	504	588					
Half Weight.	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	4	6	8	10	12	14	16	18	20	22	24
Swedes Iron Tacks*	35	40	45	50	55	60	65	75	85	100	120	140	160	175	195	215	235	255
Tinned Swedes Iron Tacks	55	60	70	80	90	100	105	110	130	145	175	205	230	255	290	320	355	385
Gimp and Lace Tacks	55	60	65	70	75	80	85	95	105	115	130	150	170	185	205	230	255	280
Tinned Gimp and Lace Tacks	70	75	85	100	110	120	130	135	140	155	185	210	240	270	305	335	370	405
American Iron Tacks†			45	50	50	55	60	65	70	80	95	110	125	140	155	170	185	200
Tinned American Iron Tacks†							85	95	105	115	140	160	185	210	235	260	285	310
Hungarian Nails, American Iron							35	45	55	65	75	90	100	110	120	130		
Hungarian Nails, Swedes Iron							40	50	60	75	85	100	110	125	135	145		
Quarter Weight and Special Uniform Weight, &c.	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	4	6	8	10	12	14	16	18	20	22	24
American Iron Tacks, qr. wt.							35	40	45	50	55	60	70	80	90	100	110	120
American Iron Carpet Tacks, qr. wt.							33	35	40	45	50	55	65	75	85	95	105	115
Tinned American Iron Carpet Tks, qr. wt.							45	50	55	60	75	85	100	110	120	135	145	160
Steel Carpet Tacks, 2 oz. papers.									45	45	45	45	45	45				
Steel Carpet Tacks, 4 oz. papers.									80	80	80	80	80	80				
Tinned Steel Carpet Tks, 2 oz. papers.									60	60	60	60	60	60				
Tinned Steel Carpet Tks, 4 oz. papers.									115	115	115	115	115	115				
Leath'd Carpet Tacks (100 in paper).								24	26	28	30	32	34					
Leath'd Carpet Tacks (144 in paper).								30	32	34	36	38	40					
Goods Sold by Length. Prices per Pound, Paper or Dozen.	2-8	2 $\frac{1}{2}$ -8	3-8	3 $\frac{1}{2}$ -8	4-8	4 $\frac{1}{2}$ -8	5-8	5 $\frac{1}{2}$ -8	$\frac{3}{4}$	$\frac{7}{8}$	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	2 $\frac{1}{2}$
Finishing Nails †			48	40	32	28	26	24	22	20	18	16	16	16	16	16	16	16
Trunk and Clout Nails †			48	40	32	28	26	24	22	20	18	16	16	16	16	16	16	16
Tinned Trunk and Clout Nails †			60	50	42	38	36	33	31	29	27	25	25	25	25	25	25	25
Tin Capped Trunk Nails †									35	30	27	25	25	25	25	25		
Finishing Nails for Machine driving †										19	17	17	17	17	17	17		
Basket Nails and Chair Nails †			51	43	35	31	29	27	25	23	21	19	19	19	19	19		
Basket Nails, Tinned †			62	52	44	40	38	35	33	31	29	27	27	27	27	27		
Copper and Brass Fin. Nails †			78		68		64		62	60	58	58	56	56	56	56	56	56
Copper and Brass Trunk and Cl't Nails †			60		56		56		56	56	56		56	56	56	56		56
Cigar Box Nails †			50		36		30		26	24	22	20	20	20	20	20		
Copper and Brass Cigar Box Nails †			100		80		72		68	64	60	60	56	56	56	56		
Com'n and Pat. Brads, full wt., pr. doz.	100		120		130		144		160	180	200	224	252	364	450	486		
Com'n and Pat. Brads, half wt., pr. doz.	50		60		65		72		80	90	100	112	126	182	225	243		
Com'n and Pat. Brads. †	125	100	80		58		48		36	30	26	25	24	22	20	18		
Brush Tacks †					70	60	50	42	36	30	26	24	24					
Brush Tacks, full wt., price per doz.					210	216	216	216	224	224	234	250						
Looking Glass Tacks †					40		36		32	28	24							
Looking Glass Tacks, full wt., pr. doz.					76		80		96	110	150							
Picture Frame Points †					32		28		24	22	20							
Hungarian Nails, Am. Iron †	26	26	22	22	20	20	20	20	20	20	20							
Hungarian Nails, $\frac{1}{2}$ -lb papers, Am. Iron.	27	27	23	23	21	21	21	21	21	21	21							
Hungarian Nails, $\frac{1}{4}$ -lb papers, Am. Iron.	28	28	24	24	22	22	22	22	22	22	22							
Hungarian Nails, Swedes Iron †	31	31	27	27	25	25	25	25	25	25	25							
Zinc Glaziers' Points, per. paper ($\frac{1}{2}$ lb).															11			

In Bulk and in Pound Papers.—Goods Sold by the Ounce.—Prices Per Pound.

Swedes Iron Tacks.*									Gimp and Lace Tacks.								
Ounce.....	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	4	Ounce.....	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	4	6	8
Per pound.....	\$1.60	1.25	1.00	.80	.66	.58	.52	.46	Per pound.....	\$1.60	1.16	.90	.80	.70	.60	.44	.36
Ounce.....	8	10	12	14	16	18	20	22	Ounce.....	10	12	14	16	18	20	22	24
Per pound.....	\$0.32	.31	.30	.29	.28	.28	.28	.28	Per pound.....	\$0.34	.32	.31	.30	.30	.30	.30	.30
Tinned Swedes Iron Tacks.*									Tinned Gimp and Lace Tacks.								
Ounce.....	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	4	6	8	Ounce.....	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	4	6	8
Per pound.....	\$1.60	1.30	1.15	1.00	.85	.70	.55	.46	Per pound.....	\$2.20	1.65	1.40	1.25	1.10	.85	.60	.50
Ounce.....	10	12	14	16	18	20	22	24	Ounce.....	10	12	14	16	18	20	22	24
Per pound.....	\$0.45	.44	.43	.42	.42	.42	.42	.42	Per pound.....	\$0.48	.46	.45	.44	.44	.44	.44	.44
Copper and Brass Tacks.																	
Ounce.....	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	4	6 and longer.								
Per pound.....	\$3.00	2.00	1.50	1.15	.95	.85	.80	.66	.56								

Any of the above kinds, Tinned or Coppered, not specified, 15 cents per pound advance on above prices.

* All kinds except Gimp, Lace, Brush, Looking Glass. † Including Carpet. ‡ In pound papers or bulk.

CURRENT HARDWARE PRICES.

JANUARY 4, 1888.

Note.—The quotations given below represent the Current Hardware Prices which prevail in the market at large. They are not given as manufacturers' prices, and manufacturers should not be held responsible for them. In cases where goods are quoted at lower figures than the manufacturers' name, it is not stated that the manufacturers are selling at the prices quoted, but simply that the goods are being sold, perhaps by the manufacturers, perhaps by the jobbers, at the figures named.

Ammunition.

Caps, Perfection, # 1000—

Elcks & Goldmark's—

F. L. Waterproof, 1-10's.....	50¢	dis 25¢
E. B. Trimm'd Edge, 1-10's.....	55¢	25¢
E. B. Ground Edge, Central Fire, 1-10's.....	70¢	7½¢
Double Waterproof, 1-10's.....	\$1.40	
Musket Waterproof, 1-10's.....	52¢	@ 50¢
G. D.....	30¢	
E. B.....	30¢	

Union Metallic Cartridge Co.

F. C. Trimm'd.....	50¢	
F. L. Ground.....	55¢	dis 25¢
Cent. Fire Ground.....	70¢	25¢
Double Waterproof.....	\$1.40	7½¢
Double Waterproof, in 1-10's.....	\$1.40	
E. B. Genuine Imported.....	45¢	
Eley's E. B.....	54¢	@ 50¢
Eley's D Waterproof, Central Fire.....	\$1.60	

Cartridges—

Rim Fire Cartridges.....	dis 50¢ & 52¢	
Rim Fire Military Cartridges.....	dis 15¢ & 2¢	
Cent. Fire Cartridges, Pistol and Rifle.....	dis 25¢ & 52¢	
Cent. Fire Cartr., Military & Sporting.....	dis 15¢ & 52¢	
Blank Cartridges, except 22 and 32 cal., an additional 10% over above discounts.....		
Blank Cartridges 22 cal.....	\$1.75, dis 50¢	
Blank Cartridges, 32 cal.....	\$3.50, dis 2¢	
Primed Shells and Bullets.....	dis 15¢ & 52¢	
E. B. Caps, Round Ball.....	\$1.75, dis 2¢	
E. B. Caps, Conical Ball, Swaged.....	\$2.00, dis 2¢	

Primers—

Bergan Primers all sizes, and B. L. Caps (for Sturtevant Shells).....	\$1.00, dis 2¢	
All other Primers, all sizes.....	\$1.20, dis 2¢	

Shells—

Paper Shot Shells, 1st & 2d or S. G. qual.....	dis 15¢ & 2¢	
Seibold's Combination Shot Shells.....	dis 15¢ & 2¢	
Paper Shot Shells, Club, Rival, Climax.....	dis 15¢ & 2¢	
Paper Shot Shells, Star Brand.....	dis 25¢ & 2¢	
Brass Shot Shells, 1st quality.....	dis 60¢ & 2¢	
Brass Shot Shells, Club, Rival & Climax.....	dis 65¢ & 2¢	

Shells Loaded—

List No. 19, 1887.....	dis 20¢ & 10¢	
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Wads—

U. M. C. & W. R. A.—B. E., 11 up.....	\$2.00	
U. M. C. & W. R. A.—B. E., 9 & 10.....	2.30	
U. M. C. & W. R. A.—B. E., 7 & 8.....	2.60	dis 20¢ & 2¢
U. M. C. & W. R. A.—P. E., 11 up.....	3.10	
U. M. C. & W. R. A.—P. E., 9 & 10.....	4.00	
U. M. C. & W. R. A.—P. E., 7 & 8.....	4.90	
Eley's B. E., 11 up.....	\$1.75	
Eley's P. E., 11 & 20.....	\$2.80	

Anvils—Eagle Anvils—

Wright's.....	9½¢	
Armstrong's Mouse Hole.....	9¢	
Armstrong's Mouse Hole, Extra.....	11½¢	
Trenholm's.....	9½¢	
Wilkinson's.....	9½¢	
J. & Riley Carr. Patent Solid.....	11¢	

Anvil Vice and Drill—

Millers Falls Co.....	\$18.00, dis 20¢	
Cheney Anvil and Vice.....	dis 25¢	
Allen Combined Anvil and Vice.....	\$3, dis 40¢ & 10¢	
Moore & Barnes Mfg. Co.....	dis 33½¢	

Augers and Bits.

Douglas Mfg. Co.....		
New Haven Copper Co.....		
Wm. A. Ives & Co.....	dis 70¢ & 70¢ & 5¢	
Humphreysville Mfg. Co.....		
French, Swift & Co. (P. H.).....		
Connecticut Valley Mfg. Co.....		
Cook's, Douglas Mfg. Co.....	dis 55¢	
Cook's, New Haven Copper Co.....	dis 50¢ & 10¢ & 50¢ & 10¢ & 5¢	
Ives' Circular Lip.....	dis 60¢	
Patent Solid Head.....	dis 30¢	
C. E. Jennings & Co., No. 1, extension lip.....	dis 40¢	
C. E. Jennings & Co., No. 30.....	dis 60¢	
C. E. Jennings & Co., Auger Bits, in fancy boxes.....		
Patent Single Twist.....	dis 20¢	
Patent Double Twist.....	dis 45¢	
Russell Jennings' Augers and Bits.....	dis 25¢	
Car Bits.....	dis 60¢ & 30¢	
L'Hommedieu & Co. Bits.....	dis 15¢ & 10¢	
Forstner Pat. Auger Bits.....	dis 10¢	

Hollow Augers—

Ives.....	dis 25¢ & 10¢	
French, Swift & Co.....	dis 25¢ & 10¢ & 5¢	
Douglas.....	dis 40¢ & 10¢	
Bonney's Adjustable # dos. 248.....	dis 20¢ & 10¢	
Ives' Expansive, each \$4.50.....	dis 60¢ & 10¢	
Universal Expansive, each \$4.50.....	dis 20¢	
Wood's.....	dis 25¢ & 10¢	

Expansive Bits—

Clark's small, \$18; large, \$36.....	dis 35¢	@ 50¢
Ives' No. 4, per doz., \$60.....	dis 35¢	@ 40¢
Swan's.....	dis 40¢	
Stearns' No. 1, \$26; No. 2, \$22.....	dis 35¢	
Stearns' No. 2, \$18.....	dis 20¢	

Bit Stock Drills—

Common.....	\$ gross \$2.75 @ \$3.25	
Diamond.....	\$ gross \$1.10, dis 25¢ & 10¢	
"Bee".....	dis 25¢ @ 25¢ & 5¢	
Double Cut, Sheardson's.....	dis 40¢ @ 45¢ & 5¢	
Double Cut, Cl. Valley Mfg. Co.....	dis 30¢ & 10¢	
Double Cut, Hartwell's, # gro.....	\$5.25	
Double Cut, Douglas's.....	dis 40¢ & 10¢	
Double Cut, Ives'.....	dis 60¢ @ 60¢ & 5¢	

Bit Stock Drills—

More Twist Drills.....	dis 50¢ & 10¢ & 5¢	
Standard.....	dis 50¢ & 10¢ & 5¢	
Cleveland.....	dis 50¢ & 10¢ & 5¢	
Syracuse, for metal.....	dis 50¢ & 10¢ & 5¢	
Syracuse, for wood (wood list).....	dis 30¢ @ 30¢ & 5¢	
Williams' or Holt's, for metal.....	dis 50¢ & 10¢ & 5¢	
Williams' or Holt's, for wood.....	dis 40¢ & 10¢	

Ship Augers and Bits—

L'Hommedieu's.....	dis 15¢ & 10¢	
Watrous's.....	dis 15¢ & 10¢	
Snell's.....	dis 15¢ & 10¢	
Snell's Ship Auger Pattern Car Bits.....	dis 15¢ & 10¢	

Awl Hatts.

Sewing, Brass Ferrule.....	\$3.50 # gross—dis 45¢ & 10¢	
Patent Sewing, Short.....	\$1.00 # gross—dis 40¢ & 10¢	
Patent Sewing, Long.....	\$1.20 # gross—dis 40¢ & 10¢	
Patent Peg, Plain Top.....	\$1.00 # gross—dis 45¢ & 10¢	
Patent Peg, Leather Top.....	\$1.20 # gross—dis 45¢ & 10¢	

Awls, Brad Sets, &c.

Awls, Sewing, Common.....	\$ gross \$1.70—dis 35¢	
Awls, Shouldered Peg.....	\$ gross \$2.45—dis 40¢ & 10¢	
Awls, Patent Peg.....	\$ gross \$3.45—dis 40¢ & 10¢	
Awls, Shouldered Brad.....	\$2.70 # gross—dis 35¢	
Awls, Handled Brad.....	\$7.50 # gross—dis 45¢	
Awls, Handled Scratch.....	\$7.50 # gross—dis 35¢ & 10¢	
Awls, Sunk Scratch.....	\$1.50 # gross—dis 25¢ @ 30¢	

Awl and Tool Sets.

Atken's Sets, Awls & Tools, No. 20, # doz.....	\$10—dis 50¢ & 10¢	
Fray's Ad Tool Hds., Nos. 1, #12; 2, #18; 3, #12; 4, #8.....	dis 25¢ @ 25¢ & 10¢	
Miller's Falls Adj. Tool Hds., Nos. 1, #12; 2, #18, dis 25¢		
Henry's Combination Haft.....	# doz, 80	
Brad Sets, No. 42, \$10.50, No. 43, \$12.50.....	dis 70¢ & 10¢ & 5¢	
Brad Sets, Stanley's Excelsior, No. 1, \$7.50.....	dis 30¢ & 10¢	
Brad Sets, Stanley's Excelsior, No. 2, \$4.00.....	dis 30¢ & 10¢	
Brad Sets, Stanley's Excelsior, No. 3, \$5.50.....		

Axes.

Makers' and Special Brands—	# doz, \$6.50 @ \$6.75	
Others.....	# doz, \$5.75 @ \$6	

Axle Grease.

Fraser's, in bulk.....	# doz, \$5 net	
Fraser's, in boxes.....	# gross \$0.50	
Dixon's Everlasting, in bxs., # doz, 1 lb.....	\$1.20; 2 lb, \$2	
Dixon's Everlasting.....	10-lb pails, each, 85¢	
Lower grades, special brands.....	# gro \$5.50 @ \$7	

Axles.—No. 1, 4¢ @ 4½¢; No. 2, 5¢ @ 5½¢; No. 3, 5½¢ @ 5¾¢; No. 4, 5¾¢ @ 6¢.		
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No. 7 to 18.....	dis 50¢ & 50¢ & 10¢	
No. 19 to 22.....	dis 60¢ & 10¢ & 60¢ & 10¢ & 5¢	
National Wrought Steel Tubular Self-Oiling Standard Farm (1 to 5) and Special Farm (A1 to A5) Less than 10 sets.....	dis 35¢ & 2¢	
Over 10 sets.....	dis 35¢ & 2¢	
X Strong Exp. (6 to 9), & XX Strong Truck (10 to 16): Less than 10 sets.....	dis 10¢	
Over 10 sets.....	dis 10¢	

Bag Holders.

Sprengle's Pat. # doz \$18.....	dis 60¢	
Salances.—Spring Balances.....	dis 50¢	
Common 24 lb.....	# doz, \$1.50—dis 50¢	
Chaiton's Spring Balances.....	dis 50¢	
Chaiton's Circular Spring Balances.....	dis 60¢	

Bells.

Light Brass.....	dis 75¢ @ 75¢ & 10¢	
Extra Heavy.....	dis 65¢ @ 70¢	
White Metal.....	dis 70¢ @ 70¢ & 10¢	
Silver Chime.....	dis 25¢ & 10¢ & 5¢	
Globe (Cone's Patent).....	dis 25¢ @ 35¢	

Bores.

Gong, Abbe's.....	dis 25¢ @ 35¢	
Gong, Yankee.....	dis 40¢ & 10¢	
Gong, Barton's.....	dis 40¢ @ 50¢	
Crank, Taylor's.....	dis 25¢ & 10¢	
Crank, Brooks.....	dis 50¢ & 10¢ & 2¢	
Crank, Cone's.....	dis 10¢	
Crank, Connel's.....	dis 20¢ & 10¢	
Lever, Sargent's.....	dis 60¢ & 10¢	
Lever, Taylor's Bronzed or Fluted.....	dis 25¢ & 10¢	
Lever, Taylor's Japanned.....	dis 25¢ & 10¢	
Lever, R. E. W. Co.'s.....	dis 50¢ & 10¢ & 2¢	
Pull Brook's.....	dis 50¢ & 10¢ & 2¢	
Pull Western.....	dis 25¢ & 10¢	

Common Wrought.

Western.....	dis 20¢ & 10¢	
Western, Sargent's list.....	dis 70¢ & 10¢	
Kentucky "Star".....	dis 20¢ & 10¢	
Kentucky, Sargent's list.....	dis 70¢ & 10¢	
Dodge, Genuine Kentucky, New list, dis 70¢ & 10¢		
Perma Star.....	dis 50¢ & 10¢ @ 50¢ & 10¢ & 5¢	
Call.....	dis 40¢ & 10¢ & 5¢	
Farm Bells.....	# doz, 25¢ @ 30¢	
Steel Alloy Church and School Bells.....	dis 40¢	

Bellows.—Blacksmiths'.

Molders.....	dis 50¢ & 50¢ & 5¢	
Hand Bellows.....	dis 50¢ & 50¢ & 5¢	

Belting, Rubber.

Common Standard.....	dis 75¢	
Standard.....	dis 70¢ & 5¢	
Extra.....	dis 60¢ & 10¢	
N. Y. B. & P. Co., Standard.....	dis 60¢ & 5¢	
N. Y. B. & P. Co., Extra Standard.....	dis 50¢ & 10¢ & 5¢	

Bench Stops.

Morrill's.....	# doz \$9—dis 50¢	
Hotchkiss's.....	# doz \$5.00—dis 10¢ @ 10¢ & 10¢	
Weston's, per doz No. 1, \$10; No. 2, \$9.....	dis 25¢ & 10¢ & 5¢	
McGill's.....	# doz \$3—dis 10¢	

Bits.—Auger, Gimlet Bit Stock, Drills, &c., see Augers and Bits.		
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Bit Holders.

Extension, Barber's.....	# doz \$15.00—dis 40¢ @ 40¢ & 10¢	
Extension, Ives'.....	# doz \$20.00—dis 60¢ @ 60¢ & 10¢	
Diagonal.....	# doz \$24.00—dis 40¢	
Angular.....	# doz \$24.00—dis 40¢ & 5¢	

Blind Adjusters.

Domestic.....	# per doz \$3.00—dis 33½¢	
Excelsior.....	# doz \$10.00—dis 50¢ & 10¢ & 2¢	
Washburn's Self-Locking.....	dis 20¢ @ 20¢ & 10¢	

Blind Fasteners.

Macrell's.....	# doz pairs, \$1.00—dis 20¢ @ 20¢ & 10¢	
Van Sand's Screw Pattern.....	#15 # gro.—dis 60¢ & 10¢	
Van Sand's Old Pattern.....	#15 # gro.—dis 55¢ & 10¢	
Washburn's Old Pattern.....	#15 # gro.—dis 55¢ & 10¢	
Merriman's.....	new list, net	
Austin & Eddy No. 2008.....	#9 # gro. net	
Security Gravity.....	#9 # gro. net	

Blind Staples.

Barbed, ¼ in. and larger.....	# doz \$8 @ 8½¢ net	
Barbed, ¼ in.....	# doz \$9 @ 9½¢ net	

Blocks.

Ordinary Tackle, list April 17, '85.....	dis 40¢	
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Boils.

Door and Shutter.....	dis 70¢ @ 70¢ & 10¢	
Cast Iron Shutter Square, &c.....	dis 70¢ @ 70¢ & 10¢	
Cast Iron Chain (Sargent's list).....	dis 65¢ & 10¢	
Ives' Patent Door Bolts.....	dis 55¢	
Wrought Barrel.....	dis 70¢ @ 70¢ & 10¢	
Wrought Square.....	dis 70¢ @ 70¢ & 10¢	
Wrt Shutter, all Iron, Stanley's list.....	dis 60¢ & 10¢	
Wrt Shutter, Brass Knob, Stanley's.....	dis 40¢ & 10¢	
Wrought Shutter, Sargent's list.....	dis 60¢ & 10¢	
Wrought Sunk Flush, Sargent's list.....	dis 55¢ & 10¢	
Wrought Sunk Flush, Stanley's list.....	dis 40¢ & 10¢ & 5¢	
Wrought B.K. Flush, Com'n Stanley's list.....	dis 55¢ & 10¢	

Carriage—

Com. list June 10, '84.....	dis 70¢ & 15¢ & 3¢	
Genuine Eagle, list Oct. '84.....	dis 75¢ @ 75¢ & 5¢	
Phila. pattern, list Oct. 7, '84.....	dis 75¢ @ 75¢ & 10¢ & 5¢	
R. B. & W., old list.....	dis 70¢	

Tire—

Common, list Feb. 28, 1883.....	dis 65¢ & 10¢
P. C. B. & N. Co., Empire, list Feb. 28, 1883.....	dis 65¢ & 10¢
P. C. B. & N. Co., Philadel., list Oct. '84.....	dis 82½¢
P. C. B. & N. Co., Keystone, Phil. list Oct. '84.....	dis 80¢
P. C. B. & N. Co., Norway, Phil. list Oct. '84.....	dis 75¢ & 10¢
Am. S. Co., Norway, Phil. list Oct. '84.....	dis 80¢
Am. S. Co., Eagle, Phil. list Oct. '84.....	dis 80¢
Am. S. Co., Philadel. list Oct. 16, '84.....	dis 80¢
Am. S. Co., Bay State, list Feb. 28, '83.....	dis 65¢ & 10¢
R. B. & W., Philadel. list Oct. 16, 1884.....	dis 82¢
R. & E. Mfg. Co.....	dis 65¢

Terry's Patent. \$ doz. pr. 3 1/2 in. \$10; 5 in. \$12.
 Cronk's Patent. No. 4, \$12; No. 5, \$14.40; No. 6, \$18.
 Wood Track, Iron Clad. ft. 10 1/2, \$10; 50 1/2, \$15.
 Architect. set \$6.00, dia 20 1/2
 Eclipse. dia 20 1/2
 Fellx. set \$4.50, dia 20 1/2
 Richards'. dia 30 1/2 to 40 1/2
 Lane's Steel Anti-Friction. dia 40 1/2 to 50 1/2
 The Ball Bearing Door Hanger. dia 20 1/2 to 25 1/2
 Warner's Patent. dia 20 1/2 to 25 1/2
 Stearns' Anti-Friction. dia 20 1/2 to 25 1/2
 Stearns' Challenge. dia 20 1/2 to 25 1/2
 Faultless. dia 40 1/2 to 45 1/2
 American. set \$6; dia 20 1/2 to 25 1/2
 Rider & Wooster, No. 1, 62 1/2; No. 2, 75 1/2. dia 40 1/2
 Paragon, Nos. 1, 2 and 3. dia 40 1/2 to 45 1/2
 Paragon, Nos. 4, 5, 5 1/2 and 6. dia 40 1/2 to 45 1/2
 Crescent. dia 60 1/2 to 65 1/2
 Nickel Cast Iron. dia 50 1/2
 Nickel, Malleable Iron and Steel. dia 49 1/2

Harness Snaps.—See Snaps.

Hatchets.—List Jan. 1, 1888.

Isiah Blood. dia 35 1/2 to 40 1/2
 Hunt's Shingling Lath and Claw. dia 40 1/2
 Hunt's Broad. dia 40 1/2
 Buffalo Hammer Co. dia 40 1/2 to 50 1/2
 Hurd's. dia 40 1/2 to 45 1/2
 Yerkes & Plumb. dia 40 1/2 to 45 1/2
 Wm. Mann, Jr. & Co. dia 50 1/2 to 55 1/2
 Underhill Edge Tool Co. dia 40 1/2 to 45 1/2
 Underhill's Haines and Bright goods. dia 33 1/2
 C. Hammond & Son. dia 40 1/2 to 50 1/2
 Simmons. dia 35 1/2 to 40 1/2
 Peck's. dia 40 1/2 to 45 1/2
 Kelly's. dia 50 1/2 to 55 1/2
 Sargent & Co. dia 50 1/2 to 55 1/2
 Ten Eyck Edge Tool Co. dia 40 1/2 to 45 1/2
 Collins, following list. dia 10 1/2
 Shingling, Nos. 1, 2, 3. \$ doz \$5.50 \$6.00 \$6.50
 Claw, Nos. 1, 2, 3. \$ doz 6.00 6.50 7.00
 Lathing, Nos. 1, 2, 3. \$ doz 6.50 7.00 7.50

Hay Knives.

Lighning. Mfrs. price \$ doz \$18 dia 25 1/2
 Electric. \$ doz \$17 dia 30 1/2
 Gem. \$ doz \$18 30 1/2
 Wadsworth's. dia 40 1/2 to 45 1/2
 Carter's Needle. \$ doz \$11.50 \$12.00
 Heath's. \$ doz \$13.50 \$14.00

Hinges.

Wrought Iron Hinges.
 Strap and T. dia 70 1/2 to 75 1/2
 Screw Hook and (8, 10, 12 in. \$ doz 3 1/2
 Strap. \$ doz 3 1/2
 Heavy Welded Hook { 8 to 12 in. \$ doz 3 1/2
 { 14 in. & up. \$ doz 4 1/2
 Screw Hook and Eye. \$ doz \$1.50 \$1.75
 { 1/2 in. \$ doz \$2.45 \$2.75
 { 3/4 in. \$ doz \$3.50 \$3.75
 Rolled Blind Hinges, Nos. 32 and 34. dia 55 1/2 to 60 1/2
 Rolled Blind Hinges, Nos. 232 and 234. dia 55 1/2 to 60 1/2
 Rolled Plate. dia 70 1/2 to 75 1/2
 Rolled Raised. dia 70 1/2 to 75 1/2
 Plate Hinges { 8, 10, 12 in. \$ doz 4 1/2
 { "Providence" over 12 in. \$ doz 5 1/2

Spring Hinges.

Geer's Spring and Blank Butts. dia 40 1/2
 Union Spring Hinge Co.'s list, March, 1886. dia 20 1/2
 Acme, Crown, Empire and U. S. dia 30 1/2
 American, Gem, and Star, Japanned. dia 30 1/2
 American, Gem, and Star, Bronzed. dia 30 1/2
 Oxford, Bronze and Brass. dia 30 1/2
 Barker's Double Acting. dia 20 1/2 to 25 1/2
 Union Mfg. Co. dia 25 1/2
 Bommer's. dia 30 1/2
 Buckman's. dia 15 1/2 to 20 1/2
 Chicago. dia 30 1/2

Gate Hinges.

Western. \$ doz \$4.40, dia 55 1/2
 N. E. \$ doz \$7.00, dia 55 1/2
 N. E. Reversible. \$ doz \$5.20, dia 55 1/2 to 60 1/2
 Clark's, No. 1 & 2. dia 60 1/2 to 65 1/2
 N. Y. State. \$ doz \$5.00, dia 55 1/2 to 60 1/2
 Automatic. \$ doz \$12.50, dia 50 1/2
 Common Sense. \$ doz pair \$4.50, dia 50 1/2
 Seymour's. dia 45 1/2 to 50 1/2
 Shepard's, Nos. 1, 2, 10 and 20. dia 60 1/2 to 65 1/2
 Shepard's, No. 3. dia 60 1/2 to 65 1/2
 Reed's Latch and Hinges. \$ doz sets \$12, dia 50 1/2

Blind Hinges.

Parker. dia 75 1/2 to 80 1/2
 Palmer. dia 50 1/2 to 55 1/2
 Seymour. dia 75 1/2 to 80 1/2
 Nicholson. dia 45 1/2 to 50 1/2
 Huffer. dia 50 1/2
 Clark's, Nos. 1, 3, 5, 40 and 50. dia 75 1/2 to 80 1/2
 Clark's Mortise Gravity. dia 50 1/2
 Sargent's, Nos. 1, 3, 5, 11, 13. dia 75 1/2 to 80 1/2
 Sargent's, No. 12. dia 75 1/2 to 80 1/2
 Reading's Gravity. dia 75 1/2 to 80 1/2
 Shepard's "Noiseless." Nos. 50, 60, 65 & 55. dia 75 1/2 to 80 1/2
 Shepard's Niagara Gravity, Nos. 1, 3 and 5. dia 75 1/2 to 80 1/2
 Shepard's Buffalo Gravity, Nos. 1, 3 and 5. dia 75 1/2 to 80 1/2
 Shepard's Champion Gravity, No. 75. dia 75 1/2 to 80 1/2
 Shepard's Gravity, No. 10. dia 75 1/2 to 80 1/2
 Shepard's Acme Lull & Porter. dia 75 1/2 to 80 1/2
 Shepard's O. S. Lull & Porter. dia 75 1/2 to 80 1/2
 Shepard's "Queen City" Reversible. dia 70 1/2 to 75 1/2
 Clark's Lull & Porter, Nos. 9, 1, 1 1/2, 2, 3. dia 75 1/2 to 80 1/2
 North's Automatic Blind Hinges, No. 2, for Wood, \$10.50; No. 3, for Brick, \$13.50. dia 25 1/2 to 30 1/2

Hoes.

Handled.
 Garden, Mortar, &c. dia 65 1/2 to 70 1/2
 Planter's, Cotton, &c. dia 65 1/2 to 70 1/2
 Warren Hoe. dia 60 1/2
 Magic. \$ doz \$4.7

Eye.

D. & H. Scott. dia 15 1/2
 Lane's Crescent Scovill Pattern. dia 45 1/2
 Lane's Crescent Planter's Pattern. dia 45 1/2
 Lane's Razor Blade, Scovill Pattern. dia 30 1/2
 Maynard. S. & O. Pat. dia 45 1/2
 Sandusky Tool Co. dia 60 1/2
 Hubbard & Co. dia 60 1/2
 Bare. dia 60 1/2
 Grub. dia 60 1/2 to 65 1/2

Hoe Rings and Ringers.

Hill's Improved Ringers. \$ doz \$5.50 \$5.75
 Hill's Old Style Ringers. \$ doz \$3.00 \$3.25
 Hill's Tong. \$ doz \$5.50 \$5.75
 Hill's Ring. \$ doz boxes \$2.00 \$2.25
 Perfect Rings. \$ doz boxes \$1.75 \$2.00
 Perfect Ringers. \$ doz \$2.50
 Blair's Hog Ringers. \$ doz \$2.60
 Blair's Hog Rings. \$ doz \$2.95 \$3.00

Champion Ringers. \$ doz \$2.00
 Champion Rings, Double. \$ doz \$2.25
 Brown's Ringers. \$ doz \$2.00
 Brown's Rings. \$ doz \$1.25 \$1.30

Hoisting Apparatus.

"Moore's" Hand Hoist, with Lock Brake. dia 15 1/2
 "Moore's" Differential Pulley Block. dia 20 1/2

Holders, Tool.

Balz Pat. \$ doz \$4; dia 25 1/2

Hollow-Ware.

Stove Hollow-Ware, Ground. dia 60 1/2 to 65 1/2
 Stove Hollow-Ware, Unground. dia 70 1/2 to 75 1/2
 enameled and Tinned Hollow-Ware. dia 70 1/2 to 75 1/2
 Oval Boilers, Saucepans & Glue Pots. dia 40 1/2 to 45 1/2
 Gray Enameled Ware. dia 40 1/2 to 45 1/2
 Agate and Granite Ware. dia 25 1/2
 Rustless Hollow-Ware. dia 50 1/2 to 55 1/2
 Galvanized Tea-Kettles. dia 50 1/2 to 55 1/2
 Inch. 5 1/2 6 1/2 8 9 7 1/2

Silver Plated.

Reed & Barton. dia 40 1/2
 Meriden Britannia Co. dia 40 1/2
 Simpson, Hall, Miller & Co. dia 40 1/2
 Rogers & Brother. dia 40 1/2
 Hartford Silver Plate Co. dia 40 1/2 to 45 1/2
 William Rogers Mfg. Co. dia 40 1/2 to 45 1/2

Hooks.

Cast Iron.
 Bird Cage, Sargent's list. dia 60 1/2 to 65 1/2
 Bird Cage, Reading. dia 60 1/2 to 65 1/2
 Clothes Line, Sargent's list. dia 60 1/2 to 65 1/2
 Clothes Line, Reading list. dia 60 1/2 to 65 1/2
 Ceiling, Sargent's list. dia 55 1/2 to 60 1/2
 Harness, Reading list. dia 55 1/2 to 60 1/2
 Coat and Hat, Sargent's list. dia 55 1/2 to 60 1/2
 Coat and Hat, Reading. dia 55 1/2 to 60 1/2

Wrought Iron.

Cotton. \$ doz \$1.25
 Cotton Pat. (N. Y. Mallet & Handle Wks.). dia 30 1/2
 Tassel and Picture (T. & S. Mfg. Co.). dia 50 1/2
 Wrought Staples, Hooks, &c. See Wrought Goods
 Bench Hooks. See Bench Stops

Wire.

Wire Coat and Hat, Gem, list April, 1886. dia 45 1/2
 Wire Coat and Hat, Miles', list April, 1886. dia 45 1/2
 Indestructible Coat and Hat. dia 45 1/2
 Belt. dia 75 1/2 to 80 1/2
 Grass. \$ doz \$2.00
 Sash. dia 55 1/2 to 60 1/2
 Whitcomb Patent. dia 55 1/2
 Hooks and Eyes—Malleable Iron. dia 70 1/2
 Hooks and Eyes—Brass. dia 60 1/2 to 65 1/2
 Fish Hooks, American. dia 50 1/2

Horse Nails.

Nos. 6 7 8 9 10
 Anable. 226 226 226 226 226 dia 25 1/2 to 25 1/2 to 25 1/2 to 25 1/2 to 25 1/2
 Clinton. 246 246 246 246 246 dia 40 1/2 to 40 1/2 to 40 1/2 to 40 1/2 to 40 1/2
 Essex. 286 286 286 286 286 dia 25 1/2 to 25 1/2 to 25 1/2 to 25 1/2 to 25 1/2
 Putnam. 246 246 246 246 246 dia 5 1/2 to 5 1/2 to 5 1/2 to 5 1/2 to 5 1/2
 Vulcan. 236 236 236 236 236 dia 12 1/2 to 12 1/2 to 12 1/2 to 12 1/2 to 12 1/2
 Northwest'n. 256 256 256 256 256 dia 10 1/2 to 10 1/2 to 10 1/2 to 10 1/2 to 10 1/2
 Globe. 256 256 256 256 256 dia 12 1/2 to 12 1/2 to 12 1/2 to 12 1/2 to 12 1/2
 A. C. 256 256 256 256 256 dia 25 1/2 to 25 1/2 to 25 1/2 to 25 1/2 to 25 1/2
 C. B. 256 256 256 256 256 dia 25 1/2 to 25 1/2 to 25 1/2 to 25 1/2 to 25 1/2
 Champlain. 256 256 256 256 256 dia 25 1/2 to 25 1/2 to 25 1/2 to 25 1/2 to 25 1/2
 New Haven. 256 256 256 256 256 dia 25 1/2 to 25 1/2 to 25 1/2 to 25 1/2 to 25 1/2
 Saranac. 256 256 256 256 256 dia 30 1/2 to 30 1/2 to 30 1/2 to 30 1/2 to 30 1/2
 Champion. 256 256 256 256 256 dia 10 1/2 to 10 1/2 to 10 1/2 to 10 1/2 to 10 1/2
 Capwell. 256 256 256 256 256 dia 10 1/2 to 10 1/2 to 10 1/2 to 10 1/2 to 10 1/2
 Star. 256 256 256 256 256 dia 10 1/2 to 10 1/2 to 10 1/2 to 10 1/2 to 10 1/2

Horse Shoes.—See Shoes, Horse.

Hose, Rubber, competition. 75 1/2 to 80 1/2
 Standard. dia 70 1/2 to 75 1/2
 Extra. dia 60 1/2 to 65 1/2
 N. Y. R. & P. Co. dia 60 1/2 to 65 1/2
 N. Y. R. & P. Co. Extra. dia 60 1/2 to 65 1/2
 N. Y. R. & P. Co., Dundee. dia 60 1/2 to 65 1/2

Ice Picks, Chisels, &c.

Am. Ice Chisel Pol'd. \$ doz \$3.00, dia 20 1/2 to 25 1/2
 National Ice Chisel. \$ doz \$6.25, dia 20 1/2 to 25 1/2
 Noves'y Ice Breakers. \$ doz \$6.25, dia 20 1/2 to 25 1/2
 Dunlap's Ring Picks. \$ doz \$2.00, dia 15 1/2 to 20 1/2
 Wood Head Picks, Sargent's. \$ doz \$1.50, dia 50 1/2 to 55 1/2
 Iron Head Picks, Sargent's. \$ doz \$1.50, dia 50 1/2 to 55 1/2
 Ice Mallets, Pick in handle. \$ doz \$2.00, dia 15 1/2 to 20 1/2
 Ice Axes, Small Cast or Mail. \$ doz \$1.25, dia 20 1/2 to 25 1/2
 Combination Ice Tools. \$ doz \$2.00 net
 Acme Ice Pick and Tongs. \$ gross \$55.00, dia 50 1/2 to 55 1/2
 Roger's Lightning Ice Chisel. \$ gross \$28.50

Ice Tongs.

Champion, S. S. & Co. \$ doz \$4.00, dia 55 1/2 to 60 1/2
 Family. \$ doz \$2.75, dia 20 1/2 to 25 1/2

Jack Screws.—See Screws.

Kettles.

Brass, 7 to 17 in. Spun, Stamped. 24 22 24 22
 Brass larger than 17 inches. 26 24
 Enameled and Tea Kettles. See Hollow-Ware

Keys.

Lock Ass'n list Dec. 30, 1886. dia 50 1/2 to 60 1/2
 Eagle, Cabinet, Trunk and Padlock. dia 35 1/2 to 40 1/2
 Hotchkiss' Brass Blanks. dia 40 1/2
 Hotchkiss' Copper and Tinned. dia 40 1/2
 Hotchkiss' Padlock and Cabinet. dia 35 1/2
 Ratchet Bed Keys. \$ doz \$4.00, dia 15 1/2 to 20 1/2

Knife Sharpeners.

Parkin's Applewood Handles. \$ doz \$6.00, dia 40 1/2
 Parkin's Rosewood or Cocobolo. \$ doz \$9.00, dia 40 1/2

Knives.

Wilson's Butcher Knives. dia 25 1/2 to 30 1/2
 Ames' Butcher Knives. dia 25 1/2
 Nichols' Butcher Knives. dia 40 1/2
 Ames' Shoe Knives. dia 20 1/2 to 25 1/2
 Ames' Bread Knives. \$ doz \$1.50, dia 15 1/2 to 20 1/2
 Moran's Shoe and Bread Knives. dia 70 1/2 to 75 1/2
 Hay and Straw. See Hay Knives
 Table and Pocket. See Cutlery

Knobs.

Door Mineral. 65 1/2 to 70 1/2
 Door Por. Jar'd. 75 1/2 to 80 1/2
 Door Por. Por. Nickel. \$2.00 to 2.25
 Door Por. Plated, Nickel. \$2.00 to 2.25
 Drawer, Porcelain. dia 55 1/2 to 60 1/2
 Hemacite Door Knob, new list. dia 40 1/2 to 45 1/2
 Yale & Towne Wood Knobs, list Dec., 1885. dia 40 1/2
 Furniture Plain. 75 1/2 gross inch. dia 10 1/2
 Furniture Wood Screws. dia 55 1/2 to 60 1/2
 Base, Rubber Tip. dia 70 1/2 to 75 1/2
 Picture, Judd's. dia 60 1/2 to 65 1/2
 Picture, Sargent's. dia 60 1/2 to 65 1/2
 Picture, Hemacite. dia 55 1/2 to 60 1/2
 Shutter, Porcelain. dia 65 1/2 to 70 1/2
 Carriage, Japanned. \$ gross \$0.6, dia 60 1/2 to 65 1/2

Ladies.

Melting, Sargent's. dia 55 1/2 to 60 1/2
 Melting, Reading. \$ doz \$1.70 \$1.75
 Melting, Monroe's Patent. \$ doz \$4.00, dia 40 1/2
 Melting, P. S. & W. dia 35 1/2 to 40 1/2
 Melting, Warner's. dia 80 1/2

Lanterns.

Tubular, No. 9, without Guards. \$ doz \$5.75
 Tubular, Liftwire, No. 0, without Guards. \$ doz \$8.50
 Tubular, Hinge Tip No. 0, without Guards. \$ doz \$6.25
 Tubular, Bottom Lift, without Guards. \$ doz \$6.25
 Tubular, U. S. Safety Lift Wire, no Guards. \$ doz \$5.00
 Guards for Tubulars, add \$ doz.
 Police, Small, \$5.00; Med. \$7.25; Large \$9.75. dia 20 1/2 to 25 1/2
 Porter's Tin R. R. dia 10 1/2 to 15 1/2

Lemon Squeezers.

Porcelain Lined, No. 1. \$ doz \$6.00, dia 25 1/2 to 30 1/2
 Wood, No. 2. \$ doz \$3.00, dia 35 1/2
 Wood, Common. \$ doz \$1.70 \$1.75
 Dunlap's Improved. \$ doz \$3.75, dia 20 1/2 to 25 1/2
 Sammis'. No. 1, \$5; 2, \$6; 12, \$18 \$ doz, dia 25 1/2 to 30 1/2
 Jennings' "Star". \$ doz \$2.50
 The "Boss". \$ doz \$2.50
 Dean's. Nos. 1, \$ doz \$6.50; 2, \$ doz \$8.50; 3, \$1.90
 Little Giant. dia 50 1/2 to 55 1/2
 King. dia 40 1/2 to 45 1/2

Lines.

Cotton and Linen Fish, Draper's. dia 50 1/2
 Draper's Chalk. dia 60 1/2
 Draper's Mason's Linen, 84 ft., No. 1, \$1.25; No. 2, \$1.75; No. 3, \$2.25; No. 4, \$2.75; No. 5, \$3.25. dia 25 1/2
 Cotton Chalk. dia 55 1/2
 Samson, Cotton, No. 4, \$2; No. 4 1/2, \$2.50. dia 10 1/2
 Yale Lake, Braided, Nos. 0, \$6.00; No. 1, \$6.50; No. 2, \$7.00. \$ doz \$7.50 gross
 Mason's Linen, No. 3 1/2, \$1.50; No. 4, \$2; No. 4 1/2, \$2.50
 Mason's Colored Cotton. dia 45 1/2
 Wire Clothes, No. 18, \$3.75; No. 19, \$3.25; No. 20, \$2.75
 Ventilator Cord, 3/4 in. Braided, White or Drab
 Cotton. \$ doz \$7.50 \$ doz, dia 20 1/2

Locks, Padlocks, Cabinet Locks, &c.

Door Locks, Latches, &c.
 List, Dec. 30, '86, chgd Feb. 2, '87. dia 60 1/2 to 60 1/2
 Note.—Lower net prices often made.
 Reading Hardware Co. (list Jan. 1, '87). dia 40 1/2 to 40 1/2
 Livingston & Co. dia 70 1/2
 Perkins' Burglar Proof. dia 60 1/2 to 65 1/2
 Plate. dia 33 1/2 to 38 1/2
 P. May's "Extension Cylinder". \$10.50 \$ doz
 Barnes Mfg. Co. dia 40 1/2
 Yale Flat Key. dia 33 1/2
 Diets Flat Key. dia 30 1/2
 L. & C. Round Key Latches. dia 30 1/2 to 35 1/2
 L. & C. Flat Key Latches. dia 33 1/2 to 38 1/2
 Romer's Night Latches. dia 33 1/2
 "Shepardson" or "U. S.". dia 35 1/2
 "Felter" or "American". dia 40 1/2 to 45 1/2
 Seed's N. Y. Hasp Lock. dia 25 1/2

Cabinets.

Eagle, Gaylord Parker and } List March, '84, revised
 Corbin. } Jan. 1, '85, dia 33 1/2 to 38 1/2
 Deits, Nos. 36 to 39. dia 40 1/2
 Deits, Nos. 51 to 63. dia 40 1/2 to 45 1/2
 Deits, Nos. 86 to 90. dia 30 1/2
 Standard Lock Co. dia 30 1/2 to 33 1/2
 "Champion" Night Latches. dia 40 1/2
 Barnes Mfg. Co. dia 40 1/2
 Eagle and Corbin Trunk. dia 25 1/2 to 30 1/2
 "Champion" Cabinet and Combination. dia 33 1/2
 Yale. dia 33 1/2
 Romer's. dia 25 1/2

Padlocks.

List, Dec. 23, 84. dia 65 1/2 to 70 1/2
 Yale Lock Mfg. Co. s. dia 33 1/2
 Eagle. dia 25 1/2
 Yale Lock Co. dia 40 1/2
 Romer's, Nos. 0 to 91. dia 35 1/2
 Romer's, Nos. 200 to 505. dia 20 1/2

Pennsylvania.....	dis 40&10	%
Nos.....	2	00
Gas Pliers.....	\$24.00	28.00 36.00 28.00
Miles' Challenge, Nos. 1 2		
Home No. 1.....	\$22.00 30.00 40.00	dis 45&10 %
Draw Cut.....	5 2 6 8	dis 55&10 %
Each.....	\$50.00 75.00 80.00 225.00	dis 20 @ 25 %
Beef Shavers (Enterprise Mfg. Co.)	dis 20&10 @ 30 %	
Chadborn's Smoked Beef Cutter.....	dis 20 @ 30 %	

Mining Knives.		
Am. (2d quality), 1 blade, \$7; 2 blades, \$12; 3 blades, \$18.....		
Lothrop's.....	dis 20&10 %	
Smith's, 1 doz, Single, \$2.00; Double, \$3.....	dis 40&45 %	
Knapp & Cowles.....	dis 50&10&60 %	

Melasses Gates.—Stebbins' Pat.	dis 70&70 @ 7 1/2 %	
Stebbins' Genuine.....	dis 60&10&10 %	
Stebbins' Tinned Ends.....	dis 40&10 %	
Chase's Hard Metal.....	dis 50&10 %	
Bush's.....	dis 20 %	
Lincoln's Pattern.....	dis 60&40 %	
Wood's.....	dis 20&10 %	

Rose Nos.....	1 2 3 4	
	\$7.00 8.00 9.00 10.00	dis 60&10&10 %

Money Drawers.—	dis 18 @ 20 %	
Muzzles.—Safety,	dis 25 %	

Nails.		
Wire Nails, list July 14, '87.....	dis 60&10&60&10 %	
Wire Nails, Standard Penny.....	dis 20 @ 25 %	
Wire Carpet Nails.....	dis 20 @ 25 %	

Nail Puller.—Curtiss Hammer.	dis 20 @ 25 %	
Giant, No. 1.....	dis 30 @ 25 %	
Pelican.....	dis 20 @ 25 %	
Boss.....	dis 30 @ 25 %	

Nail Sets.—Square.	dis 20 @ 25 %	
Round.....	dis 20 @ 25 %	
Cannon's Diamond Point.....	dis 20 @ 25 %	

Nut Crackers.		
Table (Humason & Beckley Mfg. Co.).....	dis 40 %	
Blake's Pattern.....	dis 20 @ 25 %	
Turner & Seymour Mfg. Co.....	dis 10 %	

Nuts and Washers.		
Size of bolt, in.....	1/4 5-16 3/8 1/2 5/8 3/4 1	
Square.....	7 3 5 3 4 9 4 3 4	3 4
Hexagon.....	21 12 8 4 12 8 4 12 8 4	3 4
Washers.....	7 5 4 4 4 4 4 4 4 4	3 4
In lots less than 100 lb., 1 lb. add 1/4, 1 lb. boxes add 1/2 to list.		

Oakum.		
Government.....	dis 8 1/2 %	
U. S. Navy.....	dis 7 1/2 %	
Navy.....	dis 7 %	

Oilers.—Zinc and Tin.	dis 65 @ 65&10 %	
Brass and Copper.....	dis 50&10&50&10 %	
Walleable, Hammer's Improved, No. 1, \$3.60; No. 2, \$4.00; No. 3, \$4.40	dis 10 @ 10&10 %	
Walleable, Hammer's, Old Pattern, same list.....	dis 40 %	
Prior's Patent or "Paragon" Zinc.....	dis 60&10&10 %	
Olmedstead's Tin and Zinc.....	dis 50 %	
Olmedstead's Brass and Copper.....	dis 50 %	
Broughton's Zinc.....	dis 60 %	
Broughton's Brass.....	dis 50 %	

Packing, Steam.		
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Rubber.		
Standard.....	dis 60&10 @ 60&10&10 %	
Extra.....	dis 50&10 @ 60 %	
N. Y. B. & P. Co., Standard.....	dis 50&10&50 %	
N. Y. B. & P. Co., Empire.....	dis 70 %	
N. Y. B. & P. Co., Salamander.....	dis 65 %	
Jenkins' Standard.....	dis 80 @ 85 %	

Miscellaneous.		
American Packing.....	dis 10 @ 11 @ 12 %	
Russia Packing.....	dis 14 @ 15 %	
Italian Packing.....	dis 13 @ 14 %	
Cotton Packing.....	dis 15 @ 17 @ 18 %	
Jute.....	dis 7 @ 8 @ 9 %	

Padlocks.—See Locks.		
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Pails.		
Galvanized Iron—		
Quarts.....	10 12 14	
Hill's Light Weight, 1 doz.....	\$2.75 3.00 3.25	
Hill's Heavy Weight, 1 doz.....	3.00 3.25 3.50	
Whiting's.....	2.75 3.00 3.25	
Sidney Shepard & Co.....	2.67 2.87 3.07	
Iron Clad.....	2.75 3.00 3.25	
Fire Buckets.....	2.75 3.25 3.50	
Buckets, see Wall Buckets		

Indurated Fibre Ware.—		
Star Pails, 12 qt.....	dis 40 @ 45 %	
Fire, Stable and Milk, 14 qt.....	dis 45 @ 50 %	

Fenella's Faber's Carpenters'.....	high list, dis 50 %	
Faber's Round Gilt.....	dis 50 @ 55 %	
Dixon's Lead.....	dis 40 @ 45 %	
Dixon's Lumber.....	dis 30 @ 35 %	
Dixon's Cement.....	dis 40 @ 45 %	

Picks.		
Railroad, 5 to 6, \$12.00; 6 to 7, \$13.....	dis 60&5 @ 60&10 %	
Adze Eye, 5 to 6, \$12.00; 6 to 7, \$13.....	dis 60&5 @ 60&10 %	

Picture Nails.		
Brass Head, Sargent's list.....	dis 50&10&10 %	
Brass Head, Combination list.....	dis 50&10 %	
Porcelain Head, Sargent's list.....	dis 50&10&10 %	
Porcelain Head, Combination list.....	dis 40&10 %	
Miles' Patent.....	dis 40 %	

Pinking Irons.		
1 1/2 and under, Plain.....	dis 47 1/2 %	
1 1/2 and under, Galvanized.....	dis 37 1/2 %	
1 1/2 and over, Plain.....	dis 57 1/2 %	
1 1/2 and over, Galvanized.....	dis 45 %	
Boiler Tubes, Iron.....	dis 52 1/2 %	

Planes and Plane Irons.		
Wood Planes—		
Molding.....	dis 50 @ 50&5 %	
Bench, First Quality.....	dis 60 @ 60&5 %	
Bench, Second Quality.....	dis 60&10 %	
Bailey's (Stanley R. & L. Co.).....	dis 30&10 %	

Iron Planes—		
Bailey's (Stanley R. & L. Co.).....	dis 30&10&30&10&5 %	
Miscellaneous Planes (Stanley R. & L. Co.).....	dis 20&10 %	
Victor Planes (Stanley R. & L. Co.).....	dis 20 @ 20 %	
Steer's Iron Planes.....	dis 35 @ 35&5 %	
Meriden Mal. Iron Co.'s.....	dis 30&10&30&10&10 %	
Davis's Iron Planes.....	dis 30&10&30&10&10 %	
Birmingham Plane Co.....	dis 50&50&5 %	

Plane Irons—		
Plane Irons.....	dis 20&10 %	
Plane Irons, Butcher's.....	dis 35 @ 35&5 %	
Plane Irons, Buck Bros.....	dis 30 %	
Plane Irons, Middlesex Mfg. Co., "Baldwin Iron," Single and Cut.....	dis 20 @ 25 %	
Double.....	dis 33 1/2 @ 40 %	
L. & J. White.....	dis 25 %	

Pliers and Nippers.		
Button's Patent.....	dis 30&10 @ 40 %	
Hall's Pat. Compound Lever Cutting Nippers, No. 2, 5 in., \$13.50; No. 4, 7 in., \$21.00	dis 20&10 @ 35 %	

Humason & Beckley Mfg. Co.	dis 50&50&10 %	
Gas Pliers.....	dis 60 %	
Gas Pliers, Custer's Nickel Plated.....	dis 60&5 %	
Bureka Pliers and Nippers.....	dis 40 %	
Russell's Parallel.....	dis 25 %	
P. S. & W. Cast Steel.....	dis 50 %	
P. S. & W. Finners' Cutting Nippers.....	add 6 @ 10 %	
Henry's Pat. Wire Cutters.....	dis 20 %	
Morrill's Parallel, per doz.....	dis 30&5 %	
Cronk's 8 in., \$15; 10 in., \$21.....	dis 40 %	

Plumbs and Levels.		
Regular List.....	dis 70&10&70&10&10 %	
Diston's.....	dis 45&10 %	
Pocket Levels.....	dis 70&10&70&10&10 %	
Davis Iron Levels.....	dis 30 %	
Davis' Inclination.....	dis 10&10 %	

Poppers, Corn.		
Round or Square, 1 qt.....	dis 10.50 @ 12 %	
Round or Square, 2 qt.....	dis 23.50 @ 24 %	
Post Hole and Tree Augers and Diggers.		
Samson Post Hole Digger.....	dis 30 @ 30 %	
Fletcher Post Hole Augers.....	dis 30 @ 30 %	
Bureka Diggers.....	dis 16 @ 17 %	
Leed's.....	dis 8 @ 8 @ 9 %	
Vashman's Post Hole Auger, per doz.....	dis 40.00 @ 40 %	
Kohler's Little Giant.....	dis 18.00 @ 18 %	
Kohler's Hercules.....	dis 18.00 @ 18 %	
Kohler's New Champion.....	dis 20 @ 20 %	
Schneider.....	dis 16 @ 17 %	
Ryan's Post Hole Diggers.....	dis 24 @ 24 %	
Cronk's Post Bars.....	dis 50&5 @ 50&10 %	
Gibb's Post Hole Digger.....	dis 30 @ 40 @ 40&10 %	

Potato Papers.		
White Mountain.....	dis 25 @ 25 @ 5.50	
Antrim Combination.....	dis 25 @ 25 @ 5.50	
Hoosier.....	dis 13 @ 13.50	

Pruning Hooks and Shears.		
Diston's Combined Pruning Hook and Saw.....	dis 20&10 %	
Diston's Pruning Hook.....	dis 12 @ 12.00, dis 20&10 %	
E. S. Lee & Co.'s Pruning Tools.....	dis 40 %	
Pruning Shears, Henry's Pat.....	dis 3.75 @ 4.00 net	
Wheeler, M. & Co.'s Combination.....	dis 12 @ 12.50 net	
Dunlap's Saw and Chisel.....	dis 20 @ 20 %	
J. Mallinson & Co.....	No. 1, \$5.25; No. 2, \$7.25	

Pulleys.—Hot House, Awning, &c.	dis 60&10 %	
Japanned Screw.....	dis 60&10 %	
Brass Screw.....	dis 60&10 %	
Japanned Side.....	dis 60&10 %	
Japanned Clothes Line.....	dis 60&10 %	
Empire Sash Pulley.....	dis 55 @ 60 %	
Hay Fork, Solid Eye, \$4.00; Swivel, \$4.50	dis 50&10&5 %	
Hay Fork, "Anti-Friction," 5 in. Solid, \$5.70.....	dis 50 %	
Hay Fork, "F" Common and Pat. Bushed.....	dis 20 %	
Hay Fork, Tarbox Pat. Iron.....	dis 20 %	
Hay Fork, Reed's Self-Lubricating.....	dis 20 %	
Shade Rack.....	dis 45 %	
Tackle Blocks.....	See Blocks	

Pumps.—Clister, Best Makers.	dis 50 @ 10&60 %	
Pitcher Spout, Best Makers.....	dis 60&10 @ 60&10&10 %	
Pitcher Spout, Cheaper Goods.....	dis 70&5 @ 70&10&5 %	
Punches.		
Saddlers or Drive, good quality.....	dis 60 @ 60 @ 65 %	
Bemis & Call Co.'s Cast Steel Drive.....	dis 50&5 %	
Bemis & Call Co.'s Spring and Socket.....	dis 50&5 %	
Spring, good quality.....	dis 20 @ 20 @ 25 %	
Spring, Leach's Patent.....	dis 15 %	
Bemis & Call Co.'s Spring and Check.....	dis 40 %	
Solid Tappers.....	dis 14 @ 14.44, dis 55 %	
Tappers' Hollow Punches.....	dis 20&2 %	

Rail.		
Sliding Door, Wrought Brass.....	dis 35 @ 35 @ 25 %	
Sliding Door, Bronze Wrt. Iron.....	dis 35 @ 35 @ 25 %	
Sliding Door, Painted.....	dis 44 @ 44 @ 20&10&5 %	
Sarr. Door, Light.....	dis 25 @ 25 @ 25 %	
Per 100 feet.....	2.50 3.00 4.40—dis 10 %	
B. D. for N. E. Hangers.....	Small Med. Large	
	\$2.15 2.70 3.25 net	
Terry's Wrought Iron, 7 ft.....	dis 44 @ 44 @ 5 %	
Victor Track Rail, 7 ft.....	dis 50&2 %	

Rakes.		
Cast Steel.....	dis 65&5 @ 70 %	
Malleable.....	dis 70 @ 70&5 %	
Gibbs Lawn Rake.....	dis 12, dis 40 %	
Canton Lawn Rake.....	dis 12, dis 40 %	
Fort Madison Prize Bow Rake and Spring.....	dis 25 %	
Fort Madison Steel Tooth Lawn Rake.....	dis 25 %	
Razors.—J. R. Torrey Razor Co.	dis 20 %	
Wootenholme and Butcher.....	dis 10 @ 10 @ 2, dis 10 %	

Razor Strops.		
Genuine Emerson.....	dis 60 @ 60&5 %	
Imitation Emerson.....	dis 20 @ 20 @ 10&5 %	
Torrey's.....	dis 20 %	
Badger's Belt and Combination.....	dis 20 @ 20 @ 2 %	
Lamont Combination.....	dis 20 @ 20 @ 2 %	

Rivets and Burrs.		
Copper.....	dis 70, with Jobbers' Extras.	
Iron, list November 17, 1887.....	dis 50 %	

Rivet Sets.		
Dis 50&2 @ 50&10 %		
Rods.—Star, Brass.	dis 25&2 %	
Star, Black Walnut.....	dis 40 %	

Rollers.		
Bar, Borden Sargent's list.....	dis 60&10&10 %	
Acme (Anti-Friction).....	dis 55 %	
Union Bar Door Roller.....	dis 70 %	

Rope.—Manufacturers' prices for large lots.		
Manila.....	1/2 inch and larger	dis 10 1/2 @ net
Manila.....	3/4 inch	dis 11 1/2 @ net
Manila.....	1 inch	dis 12 1/2 @ net
Manila Tarred Rope.....	1/2 inch and larger	dis 10 @ net
Manila Hay Rope.....	1/2 inch and larger	dis 10 1/2 @ net
Sisal.....	1/2 inch and larger	dis 10 1/2 @ net
Sisal.....	3/4 inch	dis 10 1/2 @ net
Sisal.....	1 inch	dis 10 1/2 @ net
Sisal Hay Rope.....	1/2 inch and larger	dis 9 1/2 @ net
Sisal Tarred Rope.....	1/2 inch and larger	dis 9 1/2 @ net
Sisal, Medium Lath Yarn.....	dis 8 1/2 @ net	
Cotton Rope.....	dis 15 @ 18 @ net	
Jute Rope.....	dis 7 @ 7 @ 7 %	

Rules.		
Boxwood.....	dis 80&10 @ 80&10&10 %	
Ivory.....	dis 50 @ 55&10 %	

Sad Irons.		
From 4 to 10, at factory.....	dis 100 @ 22.75 @ 22.85	
Self-Heating.....	dis 20 @ 20 @ 20 %	
Self-Heating, Tailors'.....	dis 25 @ 25 @ 25 %	
Gleason's Shield and Toilet.....	dis 25 %	
Mrs. Pott's Irons.....	dis 40 @ 40&5 %	
Enterprise Star Irons, new list, July 30, 1887.....	dis 40 @ 40 %	
Combined Pluter and Sad Iron.....	dis 15 @ 15 @ 15 %	
Fox Reversible, Self-Heating.....	dis 24 @ 24 @ net	
Chinese Laundry (N. E. Butt Co.).....	dis 8 1/2 @ 15 %	
New England.....	dis 15 %	

Sand and Emery Paper and Cloth.		
List April 19, 1887.....	dis 20 %	
Sibley's Emery and Crocus Cloth.....	dis 30 %	

Sash Cord.		
Common.....	dis 10 @ 11 %	
Patent, good quality.....	dis 13 @ 13 1/2 %	
White Cotton Braided, fair quality.....	dis 28 @ 28 %	
Common Russia Sash.....	dis 15 @ 15 %	

Patent	dis 15 @ 15 @ 15 %
Cable Laid Italian	dis 22 @ 22 @ 15 %
India Cable Laid	dis 22 @ 22 @ 15 %
Silver Lake, A Quality, White	dis 10&10&5 %
Silver Lake, A Quality, Drab	dis 10&10&5 %
Silver Lake, B Quality, White	dis 10&10&5 %
Silver Lake, B Quality, Drab	dis 10&10&5 %
Silver Lake, C Quality, White (only)	dis 27 @ 28 %
Sylvan Spring, Extra Braided, White	dis 30 @ 30 %
Sylvan Spring, Extra Braided, Drab	dis 30 @ 30 %
Semper Idem, Braided, White	dis 30 @ 30 %
Egyptian, India Hemp, Braided	dis 25 @ 25 %
Samson, Braided, White Cotton	dis 30 @ 30 @ 5 %
Samson, Braided, Drab Cotton	dis 30 @ 30 @ 5 %
Samson, Braided Italian Hemp	dis 30 @ 30 @ 5 %
Samson Braided Linen	dis 30 @ 30 @ 5 %

